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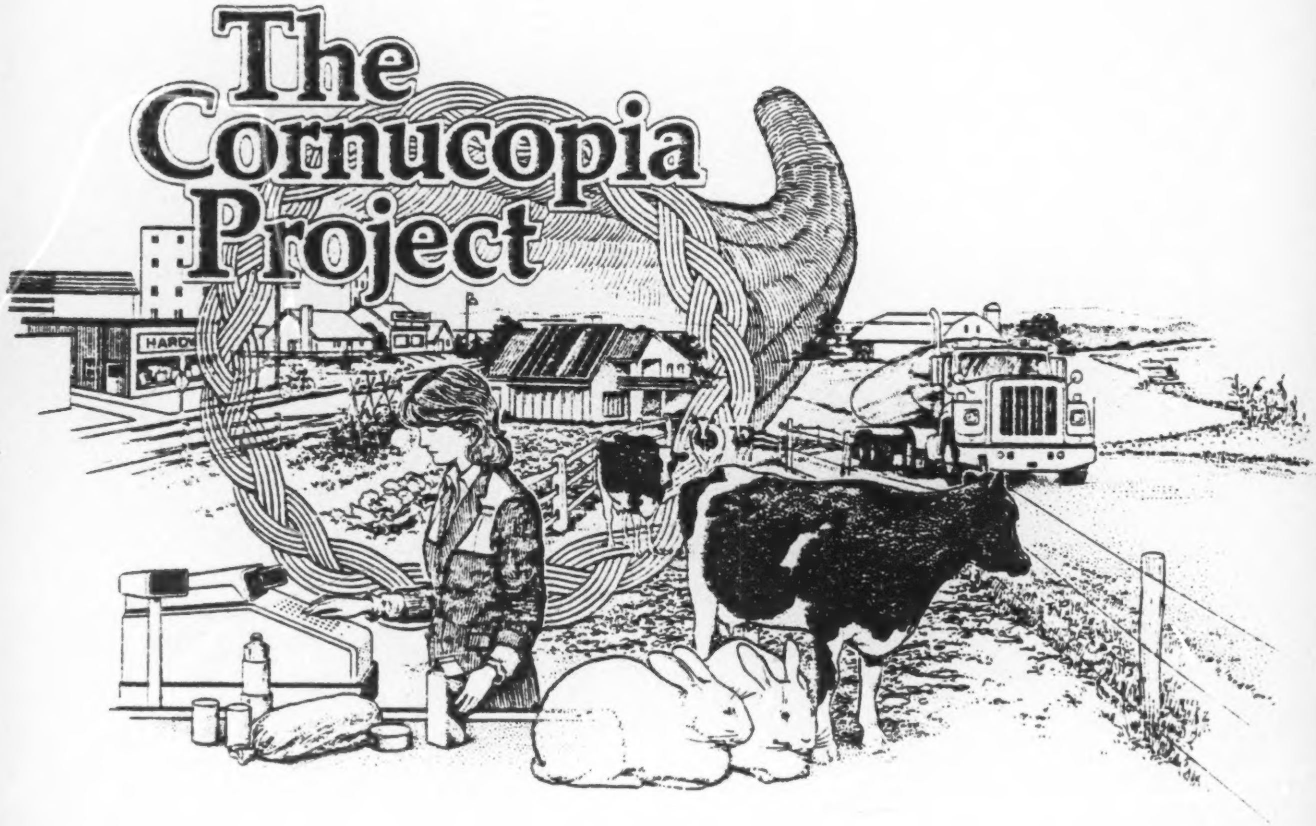
The Cornucopia Project
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THE DELAWARE FOOD SYSTEM:
FIRST RATE FOR THE FIRST STATE

A Study of the Food System of Delaware by
DENNIS W. KEISER
and
The Cornucopia Project of Rodale Press

33 East Minor Street
Emmaus, Pennsylvania 18049
(215) 967-5171
1982

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This study was funded by the Jessie Smith Noyes Foundation, Inc.

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INTRODUCTION

Delaware: The name conjures up many images. To many it's a suburb of Baltimore or a city in Maryland, and not a state at all, but to the residents of this unique state, it has characteristics and potentials not found anywhere else on the eastern seaboard. To the business world, Delaware is the corporate headquarters of such industries as DuPont and Hercules, as well as being a major producer of chemical products. To the tourist, Delaware is an area of pleasant beaches and vast recreational facilities. But to the citizens of the state, Delaware possesses one of the finest agricultural areas in the United States.

Agriculture is the number one industry in the First State, employing over 30,000 individuals, on and off the farm, from production to agricultural supplies, from processing to wholesale and retail distribution. This is eleven percent of the Delaware workforce, and rivals its well known chemical industry.[1]

Delaware has a greater percentage of its land under till than any state in the northeast. It has an estimated 679,000 acres of farmland, which is about fifty percent of the state's total landmass.[2] This is the combined land totals of 3,632 farms.[3] In 1979 these farms produced a total of over $350 million in agricultural and livestock products.[4]

Nationally, Delaware is known as one of the largest producers of mushrooms and broilers, with Sussex County being the number one broiler producing county in the United States.[5] Delaware has the unique characteristic of being able to use the same farming techniques as those employed in the midwestern part of the country, because of its flat terrain.[6] But at the same time, it has the benefit of a fishing industry along its eastern border. The state's landings of finfish and shellfish totalled $746,282 in 1979, producing such commodities as sea trout, crabs, clams, and lobsters.[7]

Being known as the state that launched a nation, Delaware was the breadbasket of the Revolution, supplying Washington's armies with food. Traditionally it was known as a truck farming state, as well as a leading peach producer. Up until the 1920's, Delaware was known as the Peach King, until the industry was devastated by blight.[8] This could have caused an economic disaster for the agricultural community, if it were not for the growing broiler industry. Research in the early decades of the twentieth century made it profitable to grow "hothouse chickens," and conditions on the Delmarva Peninsula were very favorable. By 1925, it was estimated that over 50,000 broilers were being grown in the region.[9]

The above statements appear to paint a very prosperous picture of the Delaware food system, but in reality there are several problems that are slowly emerging for the nation's second smallest state. In recent years Delaware has been experiencing a loss in farmland to urban sprawl and recreational areas;a transition from truck farming to grain production; a constantly increasing cost in the production of agricultural products, through the rising cost of energy, fertilizers, and equipment; a slowly dwindling number of vegetable processing plants; and a decrease in the size of the fishing fleet. This does not take into account the impact that can be caused by production levels decreasing in states which produce food commodities that cannot be produced in Delaware, nor the possible shortages which could occur due to such things as truckers' strikes or natural disasters, such as the med-fly invasion in California, plant diseases, or even New Castle Disease, which threatened Delaware's poultry industry just a few years ago.

This report will examine the stability of the food system in the state of Delaware, pointing out strengths and weaknesses, and making recommendations for improvements on how Delaware can have a more efficient system of food production.

THE FACTS

1. Land Use in Delaware

According to the 1980 Census of Agriculture, about 620,000 acres, or about half of Delaware's land area is in farms,[10] which is the greatest percent of land in till for any state in the Northeast.[11] Land in farms reached a peak in the 1880's, with 1,090,000 acres, or 86 percent of the state's total land area.[12] It has been slowly decreasing ever since. (See Figure I). This loss is mainly due to urbanization, recreation, and tourism. In New Castle County 67 percent of the land urbanized between 1954 and 1974 was prime farmland.[13] Also, the recent development of state parks and wildlife refuges has taken up good farmland.[14] And, with tourism playing a major role in the beachfront areas, farmland is being used for the development of tourist housing. Recommendations of the Delaware Tourism Policy Study of 1979 called for a large scale development of 3,000 acres in Sussex County, to be used for 9,000 seasonal dwellings.[15]

Much farmland is idled for reasons other than the ones above. The land has become uneconomical to farm, such as where steep slopes or small fields did not permit efficient use of modern farm machinery, or where poor drainage kept crop yields low.[16]

But although the amount of land in farms is slowly decreasing, the acres harvested is slowly increasing, as can be seen in figure I. This is due to the turning over of more woodland and pasture for cultivation, because of the loss of cropland. Such new cropland is often less productive and more costly than the farmland it replaced. Delaware has

Figure 1: Number of farms, land in farms, and cropland harvested, Delaware, 1920-1978

Year	Number of Farms	Land in Farms (1000 acres)	Cropland Harvested (1000 acres)
1920	10,300	944.5	448.4
1925	10,300	899.6	404.2
1930	10,000	900.8	407.6
1935	10,400	921.3	388.7
1940	9,500	895.5	378.4
1945	9,300	923.3	416.2
1950	8,300	851.2	389.3
1954	6,500	814.3	412.3
1959	5,700	762.5	416.4
1964	4,800	717.0	418.5
1969	4,000	673.9	423.0
1974	3,600	630.6	451.8
1978	3,600	679.0	500.4

Sources: Figures for the years 1920-1969 were taken from Delaware Agricultural Statistics, Historical Series, 1866-1974, compiled by R. C. Smith, Department of Agricultural Economics, University of Delaware, Newark, DE, and John Witzig, Maryland-Delaware Crop Reporting Service. (Agricultural Experimental Station University of Delaware, Bulletin No. 419), Sept, 1976, p. 5.

Figures for the years 1974 and 1978 were taken from Delaware Farm Income, Crop and Livestock Production 1979, compiled by Raymond C. Smith, Department of Agricultural Economics, Agricultural Experiment Station, University of Delaware, Newark, Delaware (A. E. Pamphlet No. 71), Feb. 1981, p. 15.

relatively little pasture left and not much of the remaining woodland can be economically brought into cultivation.[17] Because of pastureland being converted to farmland, the livestock population is slowly decreasing.[18] This is a very dangerous trend.

Between 1975 and 1979, Delaware lost 45,000 acres of land in farms,[19] and if this continues at a rate of about 10,000 acres per year, only about 35 percent of the total land area will be in farms by the year 2000.[20]

Another aspect to consider is Delaware's soil erosion rate. It has been estimated that the erosion rate is 3.32 tons per acre each year within the state. Although the national average is much higher, 4.7 tons per acre according to R. Neil Sampson,[21] many critics feel that Delaware's rate is still too high. The contributing factor is the large percentage of farmland used for corn production to support the broiler industry. Delaware's flat terrain, plus the strong promotion of no-tillage planting techniques, help to contribute to the low erosion rate. Research and promotion of the University of Delaware and state and federal agricultural officials have strongly encouraged and increased agricultural practices such as no-tillage and the use of clover and vetch as cover crops to reduce soil erosion.

2 . Delaware's Agricultural Commodities

If one considers, from a financial viewpoint, that Delaware's per capita net farm income ranks third or fourth in the nation (right behind California and Florida), with farmers bringing in over $334 million in 1980,[22] it seems that the agricultural community is on solid ground. But when looking at whether Delaware can feed its people, the state is in trouble. Delaware exports 79 percent of the food it produces, and imports 74 percent of what its people consume (See Delaware Food Import-Export Chart). About ten percent of the commodities consumed in Delaware (coffee, tea, citrus fruits, etc.) could never be produced in the state because of climatic and soil conditions. But this means that 64 percent of what is imported could be produced in the state. This is not being done. Why? The businessman, whether he is a broiler producer, vegetable grower, grain producer, or fisherman, will always produce commodities for which he has an assured market. As long as all present factors hold true and there is no threat of disease, energy crisis, a truckers' strike, or whatever factors threaten a food system, he will never be able to compete with the food markets of Florida, California, or foreign countries who can produce a commodity for less money than he can. This is what is affecting what is produced in Delaware. But if these factors were to change, and producers could find more of a local market within the state, they would be capable of providing for these markets. But until that need arises, Delaware will never be a self-sufficient producer of foodstuffs.

Sussex County is the number one broiler producing county in the nation, bringing in over $190 million in 1981, which is over half of Delaware's farm income. Large amounts of corn and soybeans are grown on the Delmarva Peninsula (Delaware, eastern Maryland, eastern Virginia) to support the broiler industry throughout the region. Cash farm income for corn and soybeans was more than $83 million in 1979. The combined "broiler-corn-soybean complex," as Gerald Vaughn calls it, accounts for three-fourths of Delaware's cash farm income.[23]

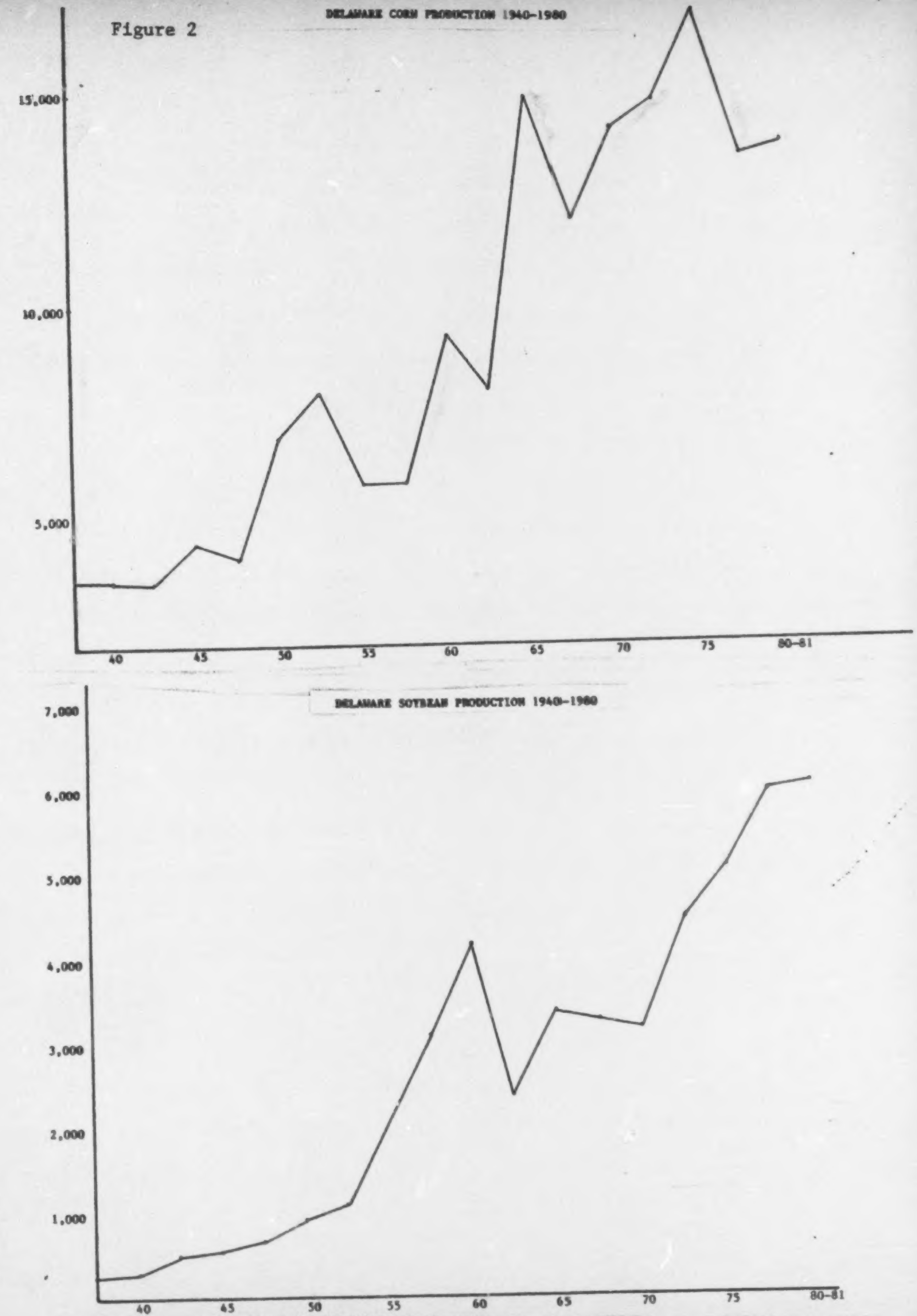
Other commodities which are grown in large quantities for export include mushrooms, beans, peas, cucumbers, and watermelons.

If Delaware produces huge amounts of a few commodities, then it is not producing other foods which its citizens consume, many of which could very easily be grown, considering the state's climate and soil and water conditions. This was not always the case. In the past, Delaware was more of a vegetable growing state, with more variety being produced. For example, the state once produced sweet potatoes, tomatoes, strawberries and canteloupes in fairly large quantities. These foods are still grown in Delaware, but in such small quantities that production figures are no longer collected. Obviously, Delaware cannot produce fresh vegetables and fruits year-round, but it can provide its citizens with these commodities four months out of the year. With a revitalized food processing industry, the state could process and package quantities for year-round use.

At the same time, production of grains has increased (see Figure 2), for two reasons: to support the growing poultry industry and to make bigger profits in farming.

As vegetable growing becomes less profitable, the variety grown will decrease. Much more money is made from growing broilers or grains or from vegetables that have two growing seasons (such as peas and beans). This is partly due to the large expensive irrigation systems needed to support farming in many areas of the state. Delaware receives adequate rainfall (about 42 inches, while about 20 inches is used per year[24]), but about 43 percent of Sussex County farmland is "moderately to severely

Figure 2



Adapted from Delaware Agricultural Statistics, Historical Series 1866-1974, Bulletin No. 419, Agricultural Experiment Station, University of Delaware, Newark, Delaware, September 1976, pp. 11 & 13. 1976-1980 figures adapted from Delaware Farm Income, by R. C. Smith, University of Delaware, Newark, Delaware, 1977 to 1980 issues, pp. 10-11.

limited by sandiness and low available moisture capacity".[25] This farmland must be irrigated because its sandy soils do not retain water.

The need for large expensive irrigation systems forces Delaware's farmers to produce commodities which will bring them high cash returns. For example, for every hundred acres of irrigated land, it costs an estimated $30,000 for a six-tower overhead irrigation system, plus $16,000 to drill the well and fixtures, plus an additional $10,000 for the power source. This does not include fuel costs for the diesel powered engines to run the irrigation system, or the license required in Delaware to dig the well, or yearly maintenence costs.[26] Another system of irrigation, more effective for vegetable growing, is the deep irrigation system. Estimated costs are $475 per acre, plus the extra costs of drilling the well, licensing, and maintenence.[27]

Another reason why the cost of farming is so high is because of the increased use of synthetic fertilizers, herbicides, and pesticides. Using these expensive chemicals even further encourages farmers to produce a high yielding cash crop, in order to cover their expenses and realize a profit.

Figure 3 shows the increased use of fertilizers in Delaware over the past thirty years. When compared to the national average, 111 pounds of fertilizer per acre,[28] the amount of manmade fertilizer used in Delaware is extremely high indeed. In 1974 commercial fertilizer cost Delaware farmers over $14 million, and almost $5 million was spent on pesticides and herbicides.[29]

With the exception of labor, perhaps the greatest single cost factor in food production is the use of petroleum products. This includes

Figure 3: Delaware Fertilizer Usage: Pounds Per Acre Cropped

Year	Acres Cropped lbs./A	Total Fertilizer lbs./A	Total Nutrients lbs./A	Total Nitrogen lbs./A	Total Phosphorus lbs./A	Total Potassium lbs./A
1942	403,900	184	40	4	19	16
1943	426,220	207	45	5	22	17
1944	439,120	204	43	6	24	16
1945	417,880	226	52	7	25	19
1946	403,400	266	60	8	30	20
1947	402,200	313	69	10	37	23
1948	406,570	266	60	9	37	22
1949	418,400	271	62	10	30	22
1950	422,720	279	65	10	31	24
1951	473,000	317	72	12	33	27
1952	440,500	370	91	16	39	35
1953	433,350	400	104	21	42	41
1954	446,750	423	115	23	44	48
1955	466,500	403	109	22	43	43
1956	481,400	358	100	21	39	39
1957	466,900	371	101	22	41	43
1958	462,350	364	103	21	40	42
1959	471,900	395	115	27	43	46
1960	499,800	358	103	24	38	41
1961	488,100	344	95	21	35	39
1962	482,200	369	105	25	36	43
1963	493,400	415	119	32	40	47
1964	496,450	424	130	38	43	50
1965	506,330	434	128	38	42	48
1966	492,900	518	150	40	50	60
1967	515,950	448	135	40	43	52
1968	481,800	504	162	50	51	61
1969	476,400	466	155	51	46	58
1979	477,000	480	166	56	44	67
1971	493,600	492	172	58	44	69
1972	488,250	462	164	55	44	66
1973	508,400	499	182	56	46	80
1974	532,800	480	184	56	44	84
1975	549,250	416	158	49	42	68
1976	545,860	494	176	62	37	77
1977	552,500	471	188	63	44	81

Courtesy of Professor Leo Cotnoir, College of Agriculture, University of Delaware, Newark, Delaware.

the manufacturing of pesticides, herbicides, and fertilizers; gasoline, diesel fuel, and oil lubricants to run farm equipment; heating oil; and the energy needed for processing and shipping food. Transportation is an especially high cost. The transportation cost for the food Delaware imports from other states comes to over $11.8 million every year.[30]

As a matter of economics, Delaware is putting all of its eggs in one basket -- the eggs in this case being broilers. The mainstay of the agricultural industry of Delaware and the Delmarva Peninsula is the broiler industry. We depend on other states to buy 96 percent of the broilers grown in Delaware.

This dependence on one commodity for such a large share of Delaware's economy can be dangerous. A recent outbreak of New Castle disease in the broiler industry could have had serious consequences. Fortunately, the disease was easily controlled, but this may not be the case the next time, and the Delaware broiler industry could go the way of the Delaware peach industry - bankrupted by disease.

3. Seafood Landings in Delaware

Although Delaware is a coastal state and benefits from a finfish and shellfish industry, it must import 81 percent of the finfish and 76 percent of the shellfish its citizens consume. Although per capita consumption of fish has increased 15 percent in the last thirty years, the poundage of fish landed in Delaware has remained pretty much the same.[31] However, the types of fish being landed have changed. There were twelve new varieties of finfish caught for sale in 1980-1981 that were not caught in 1970-1971. For example, such types of fish as spot and porgy are now available in the grocery store on a regular basis, replacing to some extent fish such as striped bass, whose landings have dropped 30 percent in the last ten years.[32]

The main change in Delaware's fish production has been in the size of the fishing fleet. (see Figure 4) The number of fishermen and boats has dropped by about fifty percent within the past ten years.[33] This reduction has been accompanied by a drastic drop in the pounds of fish caught for industrial use, but the food production levels have remained fairly steady.[34] Part of the decrease in Delaware's fishing fleet may be due to economics. Soaring interest rates and increased petroleum costs make buying and maintaining a fishing boat prohibitively expensive.

The shellfish industry has experienced a decrease in landings within the past ten years, but this, according to the College of Marine Studies, University of Delaware at Lewis, is because shellfish run in a twenty year cycle in productivity, with the twentieth year being a peak. The last peak in shellfish landings was several years ago.

Another point that should be brought out about the shellfish industry and its relatively low productivity level is the fact that the currents from the Delaware River flow down the Delaware side of the Delaware Bay, whereas the ocean currents flow up the New Jersey side of the Delaware Bay. This means that New Jersey has a seven times greater productivity level on its shoreline than Delaware does.[35] It has nothing to do with man-made problems such as pollution, but is a work of Mother Nature.

Figure 4: Commercial Fisheries* in Delaware: 1951-1979

Year	Number of Fishermen	Number of Boats
1951	1,706	403
1952	918	282
1953	1,050	349
1954	1,189	378
1955	1,321	378
1956	1,257	392
1957	1,434	431
1958	1,384	425
1959	894	363
1960	719	417
1961	781	420
1962	742	350
1963	662	198
1964	631	244
1965	520	263
1966	449	278
1967	445	218
1968	433	190
1969	462	242
1970	623	237
1971	714	285
1972	748	273
1973	779	252
1974	548	266
1975	487	220
1976	-	-
1977	473	276
1978	270	205
1979	295	192

*Fishing credited to ports within Delaware at which the fish are landed and sold on an open market.

Source: Dimensions on Delaware, A Statistical Abstract for 1979, prepared by the Office of Management, Budget, and Planning, Dover, Delaware, September, 1980, p. 579.

4. Meeting Demand

When you consider the location of Delaware and the advantages of having a two-crop growing season, the state could very well be the fresh produce grower not only for its own residents but for such neighboring metropolitan areas as Washington D.C., Baltimore, Philadelphia, and even New York. Although this would be on a limited basis, with mainly four months of harvest time out of the year, it could ease the cost to consumers for many fresh commodities. This is only accounting for fresh produce; there would be additional potential for processing and canning facilities. But the processing industry is declining in Delaware. The relatively small Delaware vegetable farms find it hard to compete with the consistant year-round production of California and other states.[36]

Delaware does have a large statewide network of U-Pick operations, roadside markets, and some farmers markets for direct marketing of fresh produce. But there is no central terminal wholesale marketing for small farmers wishing to sell their produce for packaging.[37]

Since there is no wholesale center in Delaware with which growers can deal in marketing their commodities, clearinghouses located in New Jersey, Maryland, and Virginia are more than anxious to accept any commodities that Delaware growers can provide them. This means that instead of local produce reaching Delaware's food stores, it winds up in other states.[38]

The only way that consumers in Delaware can get locally grown fresh vegetables is to go to a U-Pick operation or roadside stand. Some local supermarkets, such as Safeway and IGA do accept some local produce, and the Department of Agriculture will place signs in the stores labeling locally grown food, but this is an exception rather than the rule.

GOOD MARKS FOR DELAWARE: WHAT IS ALREADY BEING DONE

According to the Assistant Secretary of Agriculture, Mark Kooker, agriculture is Delaware's number one industry and the state's number one concern. Many new developments within the past few years are helping to improve the food situation in Delaware.

Some agricultural improvements are in the form of state legislation. A new law, entitled "The Delaware Agricultural Lands Preservation Act of 1981," has recently been passed to protect and preserve those areas in Delaware that are best suited for agricultural production.[39]

Although this bill has been signed into law, no formal course of action has yet been taken by the state to slow down the process of conversion of agricultural land to non-agricultural use. This is a sad point for Delaware, especially when one considers that its neighbor, Maryland, has actively, for the past four years, been purchasing the development rights to farms that are participants in the Department of Agriculture's program known as the Maryland Agricultural Land Preservation Foundation. Maryland has strongly promoted the necessity of agricultural land preservation. At this point in time, according to Delaware Department of Agriculture officials, the preservation program has been turned over to the county planning offices, and it will be their responsibility to implement some type of preservation program.

The law requiring licensing of all wells in the state acts as a regulatory system to prevent abuse of water reserves. Another law requires that commercial appliers of herbicides and pesticides must be licensed. In addition, commercial appliers as well as any other users of these chemicals must take state courses on their safe and proper use. There have been cases of licenses being revoked because of misuse or mismanagement of chemicals.[40]

A second area in which Delaware is working to improve the food situation is in research into better farming methods and alternative food sources. No-tillage farming is becoming more widely used. It is a process by which crops are "planted with minimal soil disturbance into some type of plant residue...(it) can save energy, or make it possible to use energy more efficiently, and has the potential to increase yields."[41] Other advantages to no-tillage are that it builds up the soil, reduces leaching and soil erosion by wind and water, and saves water.[42]

Research to improve agriculture within the state is being conducted at the University of Delaware. The University's College of Agriculture is experimenting with different farming techniques and land use. Research is also being done to increase broiler production while lowering costs. The College of Marine Studies at the University of Delaware is conducting research in the use of oyster and clam seedlings to seed beds and increase production of these shellfish. The College is also working on the growing of salt water plants, called halophytes, for human and animal food.

The University of Delaware is also doing research on how to improve the food system itself, in wholsale marketing of commodities, for example. They also help monitor food production and trends within the state. The University of Delaware, in conjunction with the State Department of Agriculture publishes many pamphlets for use by professional grain and vegetable growers, as well as for home gardeners.

The state of Delaware has a very strong agricultural community, with organizations such as the Grange, Delaware Farm Bureau, the Department of Agriculture, and the extension offices of the University of Delaware and Delaware State College. The Delaware State College extension office is working on home gardening with low-income families. One new organization, the Vegetable Growers Association, formed just a few years ago, is helping to organize these farmers, advising them of new techniques and research in vegetable production, and acting as a guide to available markets.

One interesting point and another plus for Delmarva is that another food commodity will soon be on the market. A fresh rabbit meat processing plant will be in operation in Greensboro, Maryland by the middle of 1982.[43]

RECOMMENDATIONS FOR CHANGE

It is very difficult to consider Delaware as an isolated state, since it is very small and depends on many resources and processing facilities located in both Pennsylvania and Maryland. It would be of great benefit, when looking at the Delaware food system, to conduct a study of the Delmarva Peninsula (eastern Maryland, the lower two-thirds of Delaware, and eastern Virginia), since the residents of the Peninsula interact as a community instead of looking at themselves as being parts of three different states. And when looking at northern Delaware, you must take into consideration northeast Maryland, southeastern Pennsylvania, and even part of southwestern New Jersey, because this is another distinct region, agriculturally, economically, and socially.

But even if Delaware is considered in this manner, it does not change the fact that it is in no way a self-sufficient state. And we cannot depend on Pennsylvania and New Jersey, because those states are just as dependent on California, Florida, and other states as Delaware is. Pennsylvania imports 71 percent of its consumption,[44] while New Jersey imports 82 percent of what its people consume.[45]

In order for Delaware to be self-sufficient in the crops it is able to grow, we would need about 247,000 acres of farmland (see Delaware Food Chart). Delaware now farms over 679,000 acres.[46] The state is a strong producer of some commodities, while being weak in others. The following list indicates some strengths and weaknesses in what Delaware produces:

Surplus Exported

- barley
- rye
- soybeans
- peas
- beans
- cucumbers
- sweet corn
- mushrooms
- potatoes
- apples
- watermelons
- chickens and broilers
- turkeys

Commodities Imported

- oats
- wheat
- asparagus
- beets
- broccoli
- cabbage
- carrots
- cauliflower
- celery
- eggplant
- garlic
- lettuce
- onions
- spinach
- sweet potatoes
- tomatoes
- canteloupes
- all fruits except apples
- all meats except chicken and turkey

All of these commodites are grown in Delaware to some extent, but they are grown in small quantities and the production figures are not recorded. Also, it should be remembered that production figures for home gardens or small farms with production sales under $2500 are not taken into consideration when the state collects agricultural production figures.

In addition to concentrating on the above commodities that we import, Delaware growers could possibly extend their growing season with several of the following cold weather crops: Chinese cabbage, brassicas, kale, parsnips, and Jerusalem artichokes.

Delaware, it must be remembered, has the advantage of two growing seasons for such crops as peas, broccoli, carrots, beets, lettuce varieties, cabbage varieties, and onions.

Also, recent research provided by the Rodale Research Center has found that the grain crop amaranth has a strong potential as a new food source. Certain varieties such as Gangeticus (Joseph's Coat) can be used not only as a grain crop but the leaves can be used as a spinach substitute. Amaranth has, in most cases, been looked upon as a weed, but has great potential as a new grain crop on the Delmarva Peninsula.

As mentioned earlier in this report, one of the problems in Delaware's agriculture picture is the slowly dwindling number of fresh vegetable processing plants in the state. It is strongly recommended that the Department of Agriculture, as well as the Delaware Development Office, make an all-out effort to conduct a feasibility study of the potential for new processing plants to be brought into the state, and promote this idea, if feasible, to investors and corporations. This would increase marketing advantages for vegetable growers. For example, Delaware could very well grow enough sugar beets to be self-sufficient in sugar production, if there was a sugar beet processing plant within the state.

The Cornucopia Project of Rodale Press brings out some points that would be of good advice to food industry executives and processing plant owners in the future:[47]

1. Long-term planning will become increasingly important;
2. Food transportation will have to be kept to a minimum, as the costs of petroleum products continue to rise;
3. Dependence on fresh food will increase;
4. Seasonal eating patterns will return;
5. The consumer will continue to grow in sophistication and understanding;
6. Food will begin to be viewed in new ways;
7. A revitalization in the discipline of home economics will occur.

Another strong recommendation is to develop a better statewide direct marketing outlet system, consisting of such things as roadside stands, farmers' markets, farm stores, and pick-your-own operations. It should be a joint effort of the Department of Agriculture and the farmers to promote this idea and encourage the consumer to support such a system. Some of the supporting facts that could be brought to the public's attention are:

By establishing a farmers' market "the benefits may include a 16 to 40 percent increase in income for farmers and a 17 to 70 percent cost savings to the consumers."[48]

"In Colorado consumers got an average 28 percent discount at farmer's markets compared to supermarket prices, while farmers got 44 percent higher returns than if they had sold through wholesale channels...A New York city study of direct marketing showed consumer savings ranging from 7 to 35 percent."[49] The effect of a healthy farm sector goes far beyond the farmer and the consumer. Each dollar of food produced by the farmer has a "ripple" effect in the rest of the economy. Figures vary from state to state, but in Pennsylvania it has been estimated that for each dollar the farmer produces in the crop sector, $1.81 is generated throughout the economy in total product.[50]

The next step that the citizens of Delaware can take to improve their food system is to grow their own foodstuffs, the most practical way being a backyard garden. A 1981 Gallup Survey, sponsored by Gardens for All, the National Association for Gardening, found that 38 million households -- 47 percent of all households in the United States -- had vegetable gardens in 1981. This is an increase of four million gardens over 1980.[51] And this figure does not include another seven million gardeners who grew some vegetables in containers on porches, patios, and decks.[52] The total yield from home gardens in 1981 was 19 billion pounds of vegetables, worth about $16 billion or about $414 per garden.[53] In 1981, the average family of four in the Northeast spent approximately $4000 to $6000 per year on food.[54] Even with a twenty-five dollar expenditurefor seeds and tools, a family could save six to ten percent on their yearly food bill by having a garden.

Although these facts are based on a national average, it is probably typical for Delaware as well. (The state of Delaware does not collect this sort of data.) It would be of great advantage to the Delaware food system if those who have the space to have a garden could be inspired to do so, and those who don't have the space were provided with an area in which to garden, either individually or collectively as a community project. There has been a growing movement nationally in urban areas to claim vacant lots for the production of community foodstuffs. A program such as this would help to improve the diets of many people, along with providing recreational opportunities for young and old alike, add some aesthetic qualities to urban areas, and also help to provide the people with a sense of worth and self-reliance.

Home and community gardens could produce nearly 80 percent of the total vegetables consumed nationally. It also has been found that "With some practice, an intensive gardener can have yields four to five times greater than the national average."[55] Community garden programs could be developed through state or community organizations, religious or civic groups, as well as in conjunction with programs working with the elderly, young people or the mentally handicapped. Depending on local zoning laws, such foodstuffs as quail, chicken, rabbits, and fish can be raised on very small plots of land. Citizens of Delaware could also take advantage of the hunting of waterfowl and small game, and fishing, crabbing, and clamming available in the state.

Beyond the production and harvesting of food, the promotion of home processing of foods should be encouraged, through organizations such as the extension service, and religious and civic groups. Home canning, freezing, and food drying could help to extend a household's personal harvest well into the winter months. (See Figure 5)

Figure 5

VEGETABLES FOR STORAGE

Beets. Pick mature vegetables before first killing frost. Pack in layers of damp sawdust or sand. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 4 to 6 months.

Brussels sprouts. Harvest after a few mild frosts. Store in perforated plastic bags. Requirements: 32 to 40° F., 90 to 95 percent humidity. Life: 3 to 5 weeks.

Cabbage. Pick firm, solid heads, and trim off loose outer leaves. Place heads on shelves, string them up by the roots, or wrap in newspaper and store in boxes or bins. (Beware: cabbage emits a strong odor during storage.) Requirements: 32 to 40°F., 80 to 90 percent humidity. Life: 2 to 4 months.

Cabbage, Chinese. Store only mature, solid heads picked before a severe frost. Store as with regular cabbage, or pack roots in damp soil or sand. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 2 to 4 months.

Carrots. Dig before any hard freezes. Store in cartons of sawdust, sand, or leaves. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 6 to 8 months.

Celery. Store in trenches in the garden, or place roots in boxes of sand or soil. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 1 to 2 months.

Endive, escarole. Pick after moderate fall frosts. Store with roots in soil or sand. Requirements: 32 to 40°F., 80 to 90 percent humidity. Life: 2 to 3 months.

Garlic. After curing, store in paper bags, or braid into strings and hang from rafters. Requirements: 35 to 40°F., 60 to 70 percent humidity. Life: 6 to 8 months.

Horseradish. Dig anytime in fall. Store in damp sand or sawdust. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 4 to 6 months.

Jerusalem artichokes. Mulch in garden or store in plastic bags or damp sand. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 1 to 2 months.

Kohlrabi. Remove leaves and roots. Store in damp sand or sawdust. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 2 to 3 months.

Onions. After curing, remove tops and store in bins or string bags, or braid and hang from rafters. Requirements: 35 to 40°F., 60 to 70 percent humidity. Life: 4 to 6 months.

Parsnips. Mulch in ground or store in damp sawdust, sand, or leaves. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 4 to 6 months.

Potatoes, sweet. After curing, wrap individually in newspaper and pack in baskets, or pack loosely (make sure potatoes aren't touching) in cartons of sawdust. Requirements: 50 to 60°F., 60 to 70 percent humidity. Life: 3 to 5 months.

Potatoes, white. Late potatoes store best. After curing, pack in baskets or boxes. Don't store near apples, which give off a gas that promotes sprouting. Requirements: 32 to 40°F., 80 to 90 percent humidity. Life: 4 to 6 months.

Pumpkins. After curing, place on shelves or in boxes. Requirements: 50 to 60°F., 60 to 70 percent humidity. Life: 4 to 6 months.

Rutabagas. Dig after a few mild frosts. Store in damp sand, sawdust, or moss. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 2 to 4 months.

Salsify. Mulch in garden, or store like parsnips. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 1 to 2 months.

Squash, winter. After curing, pack on shelves or in boxes. Requirements: 50 to 60°F., 60 to 70 percent humidity. Life: 4 to 6 months.

Tomatoes, green. Pick mature green fruits before frost. They will gradually ripen at 55 to 70°F. Requirements: 50 to 60°F., 60 to 70 percent humidity. Life: 4 to 6 weeks.

Turnips. Harvest before a heavy freeze. Store like carrots. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 2 to 4 months.

Source: Roger B. Yepsen, ed., Home Food Systems, Emmaus, PA: Rodale Press, 1981, p. 240.

One final recommendation dealing with local foodstuffs would be the promotion of foodbanks. Basically, a foodbank is a "nonprofit clearing house that gathers, stores and redistributes surplus food to charity. The food comes from diverse sources, including producers, retailers, grocery stores, farmers, and even families with large gardens. It is useable but not saleable for several reasons: items may have been over-produced or discontinued, produce may be the wrong size, or the merchandise may be out of date."[56]

The basis for all our agricultural production is the soil, a priceless resource that must be carefully preserved and maintained. The topsoil we use to grow crops is composed of weathered rock, organic matter, and living organisms. A soil's quality depends on how well these three elements are maintained. Erosion and over applications of synthetic fertilizers and pesticides can, over a period of time, diminish soil quality. For this reason, current production methods should be carefully examined in order to determine their full impact on the soil.

Synthetic agricultural chemicals should be used with discretion because of their dependence on petroleum. In times of oil shortage, these petrochemicals could become prohibitively expensive, or simply unavailable. Nationwide, the manufacturing of chemical fertilizers and pesticides uses almost twice as much energy as field machinery.[57] Farmers who are familiar with and practice -- even on a limited basis -- less energy intensive methods of farming will be better prepared to handle any changes that might occur.

According to experts at the College of Agriculture of the University of Delaware, it is possible for the entire state to return to organic methods of fertilizing the soil. The poultry industry alone produces enough manure to fertilize 20,000 acres of corn. Sludge, paper wastes, leaves, and other organic wastes are also available for use as fertilizer. Because the level of industry in the farming regions of Kent and Sussex Counties is very light, it would be possible to use sludge from municipal sewage treatment plants.[58]

Conversion from an energy intensive, petrochemical-based farming system to a more sustainable organic method requires careful consideration and planning. In his book Small is Beautiful, E. F. Schumacher recommends that farmers set aside a small portion of their cropland -- as little as five percent -- and use more traditional, organic methods of farming. This would provide farmers with a system for comparing different systems, as well as keeping their knowledge current, in the event a complete changeover to organic methods was suddenly required.[59] The state Department of Agriculture and University should also research and compare different farming systems, to determine what is best for the state's farmers and resources. Another proposal is to do a state research study comparing the farming practics of low technology farmers such as the Amish or Mennonites, to the higher-technological farmers of the region.

In conducting this study, one of the problems encountered was that there was not a central location for data pertaining to production of food in Delaware. Information was found scattered throughout several governmental and educational institutions. It is recommended that the state implement, as part of the Department of Agriculture, a division known as the Food Resource Data Center. It would be this agency's job to:

1. Monitor food production at all levels within the state, and keeping track of minor crops to a more efficient level.
2. Make recommendations as to the best regional varieties of crops to be grown, both on large commercial and home gardening scales.
3. Be a clearinghouse for information dealing with the preparation and processing of foods.
4. Hold workshops and public awareness programs on better consumer food production, purchasing and use.
5. Help in the establishing and implementing of direct marketing of locally grown produce.
6. Act as a technical assistant in the development of community gardens.
7. Provide a toll-free hotline for information about the location of local produce being sold.
8. Provide encouragement and work as a liaison in getting more local foodstuffs into more supermarket chains.
9. Provide labels and in-store displays stating "Grown in Delaware" for use on canned and frozen products.

Some of these things are being done, but the services are scattered between different governmental and educational institutions. A Food Resource Data Center would provide these services more efficiently.

EMERGENCY FOOD PLAN

A final recommendation is for the state to draw up an emergency food plan. This recommendation is to be looked upon as a food insurance program. The state could make recommendations to the public in the event of any type of disruption in the food system, whether it be manmade or natural disaster.

CONCLUSIONS

Although no one has all the answers to the problems facing the Delaware food system, this report was written to be used as a tool of guidance and as a stimulus for other individuals to investigate how they can improve upon the system through their own personal input. It is hoped that both governmental and educational agencies will take it upon themselves to use this report as a thought provoking document and look into the weaknesses which exist at the present time in both agricultural and marine food sources. From the standpoint of the individual citizen, it is only through each person's participation in this state food system that change can come about. Delaware can be known not only as the First State that launched a nation, but also as the First State that launched a program in food self-reliance.

Footnotes

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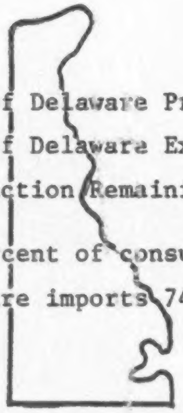
APPENDIX

Delaware contributed to the growth of our country by providing General Washington's armies with food during the Revolutionary War. Earlier in this century, Delaware's fresh fruits and vegetables were well known up and down the east coast. With 50 percent of its land under till, it's easy to see why agriculture is Delaware's most important business, bringing in cash receipts of over $350 million in 1979. In recent years, Delaware has turned from diversified truck farming to other areas, including the broiler industry and its support crops of corn and soy beans.

Despite those apparent successes, 74 percent of the food Delaware residents consume is imported from states as far away as Florida, Texas, California, and Oregon. Transporting this food (much of which could be grown in Delaware) from all over the country makes up $11.8 million of Delaware's yearly expenditures for food. Delaware can do many things to decrease its dependence on these long, vulnerable food supply lines. Consumers can adjust their eating habits and take advantage of foods that can be grown and processed in Delaware. A central marketing facility in Delaware would help farmers get a fair price for their food crops while providing grocery stores, schools, and other institutions with the quantity and quality of food they need. Research is needed to find varieties of crops best suited to Delaware's climate, terrain, and soil types. Low input farming, which employs only minimal irrigation, tillage, and chemical fertilizers and pesticides, needs to be tested and perfected on Delaware farms. Through these and other steps, Delaware's food and agriculture system can become a sustainable, productive means of feeding Delaware residents.



Retail Value of Delaware Production	$ 373,545,000
Retail Value of Delaware Exports	294,751,900
Value of Production Remaining	$ 78,793,100

26 percent of consumption produced in Delaware

Delaware imports 74 percent of its food.

DELAWARE FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION						
	Retail Weight[a] (1,000 lbs)	Retail Value[a] ($1,000) (1981 dollars)	Retail Weight (1,000 lbs.)	Retail Value ($1,000) (1981 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of DE Consumption
Meat									
Beef & Veal	3,745.1	5,066.0	47,498.9	34,531.7	92.1	30,803.7			36,763.46[c]
Lamb & Mutton	0		773.8	359.8	100.0	359.8			476.18[d]
Pork	16,385.0	7,143.0	37,975.3	16,557.3	56.8	9,404.5			40,766.7[d]
Poultry									
Chickens & Broilers	758,823.0	197,650.0	30,118.4	6,023.7			96.0	189,744.0	8,436.5[e]
Turkeys	6,786.0	2,850.0	5,892.7	2,474.9			13.2	375.1	2,063.27[f]
Eggs	16,972.2[g]	7,928.0	21,011.4	9,817.2	19.0	1,865.3			9,013.6
Fish[h]									
Finfish	613.5	339.6	3,214.2	5,785.6	80.9	5,446.0			NA[i]
Shellfish	342.8	390.6	1,428.5	1,999.9	76.0	1,599.9			NA
Dairy Products									
Fluid Milk & Cream	129,000.0	16,344.0	138,687.4	17,371.7	7.0	1,227.4			NA[j]
Condensed & Evaporated Milk	0		4,464.2	474.9	100.0	474.9			NA
Butter	0		2,678.5	290.3	100.0	290.3			NA
Cheese	NC[k]		12,916.4	1,438.9					NA
Milk, Dry Whole & Nonfat	0		2,142.8	1,944.8	100.0	1,944.8			NA
Frozen Dairy Products	0		15,297.3	6,845.5	100.0	6,845.5			NA
Vegetables									
Asparagus	.45	222.0	178.6	873.4	74.6	651.6			192.63
Beans, Lima	17,140.0	2,340.0	1,785.7	326.8			89.6	2,082.6	1,062.92
Beans, Snap	24,400.0	2,062.0	773.8	65.4			96.9	1,996.6	155.38

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DELAWARE FOOD IMPORTS

	PRODUCTION		CONSUMPTION						
COMMODITY	Retail Weight[a] (1,000 lbs)	Retail Value[a] ($1,000) (1981 dollars)	Retail Weight (1,000 lbs)	Retail Value ($1,000) (1981 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of DE Consumption
Vegetables (cont.)									
Beets	0		238.1	5.07	100.0	5.07			8.31
Broccoli	0		654.7	124.4	100.0	124.4			79.84
Cabbage	0		773.8	66.5	100.0	66.5			30.46
Carrots	0		3,333.3	363.3	100.0	363.3			124.38
Cauliflower	0		714.3	152.1	100.0	152.1			72.89
Celery	0		4,107.1	376.2	100.0	376.2			84.5
Cucumbers	15,380.0	984.0	2,380.9	152.4			84.5	831.6	278.79
Corn, Sweet	32,060.0	1,079.0	3,988.0	134.2			87.6	944.8	385.69
Eggplant	0		297.6	47.3	100.0	47.3			15.9
Escarole	0		357.1	67.8	100.0	67.8			26.7
Garlic	0		476.2	72.4	100.0	72.4			36.63
Green Peppers	0		1,964.2	390.9	100.0	390.9			211.2
Lettuce	0		14,344.9	1,477.5	100.0	1,477.5			882.76
Mushrooms	6,538.0	5,560.0	702.4	455.2			89.3	4,965.1	NA
Onions & Shallots	0		6,487.9	491.8	100.0	491.8			207.95
Peas	26,400.0	2,219.0	1,785.7	190.2			93.2	2,068.1	676.42
Potatoes	151,800.0	8,416.0	29,404.1	1,617.2			80.6	6,785.8	1,336.55
Spinach	0		357.1	15.4	100.0	15.4			24.03
Sweet Potatoes	0		2,321.4	200.3	100.0	200.3			201.86
Tomatoes	3,166.0	107.0	6,547.5	221.3	51.6	114.2			218.9
Other Vegetables[1]		4,056.0							
Vegetables, Canned									
Asparagus	NC		178.6	292.9					235.01
Beans, Lima	NC		178.6	98.2					129.69
Beans, Snap	NC		3,511.8	1,313.4					502.09
Beets	NC		595.2	313.6					26.81
Carrots	NC		297.6	189.7					14.8
Corn, Sweet	NC		3,214.2	1,189.3					373.02
Peas	NC		1,904.7	696.2					533.17
Pickles	NC		5,178.5	7,508.8					451.15
Sauerkraut	NC		595.2	177.1					43.56

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DELAWARE FOOD IMPORTS

	PRODUCTION		CONSUMPTION						
COMMODITY	Retail Weight[a] (1,000 lbs)	Retail Value[a] ($1,000) (1981 dollars)	Retail Weight (1,000 lbs)	Retail Value ($1,000) (1981 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres requimd to produce 100% of DE Consumption
Vegetables, Canned (cont.)									
Spinach	NC		476.2	331.9					28.87
Sweet Potatoes	NC		595.2	345.2					66.87
Tomato Products	NC		14,047.3	9,112.1					729.4
Vegetables, Frozen									
Asparagus	NC		47.6	177.2					61.61
Beans, Lima	NC		297.6	300.6					204.95
Beans, Snap	NC		660.7	572.8					176.85
Broccoli	NC		797.6	748.0					116.72
Carrots	NC		636.9	514.3					39.59
Cauliflower	NC		291.7	314.9					35.72
Corn, Sweet	NC		1,238.1	1,304.9					143.69
Onions	NC		404.5	334.5					16.94
Peas	NC		1,011.9	950.4					416.64
Potato Products	NC		43,987.4	37,097.4					4,438.7
Spinach	NC		422.6	287.4					28.44
Fruits, Fresh									
Apples	13,000.00	1,218.0	9,702.2	941.1			25.4	309.4	481.25[m]
Bananas	NA		12,559.2	4,018.9					NA
Cantaloupes	0		4,642.8	5,199.9	100.0	5,199.9			336.43
Cherries	0		357.1	192.8	100.0	192.8			371.9[n]
Grapes	0		1,964.2	232.7	100.0	232.7			431.7[n]
Peaches	1,500.0	195.0	3,095.2	404.2	51.5	207.4			153.53[m]
Pears	0		1,428.5	209.9	100.0	209.9			204.07[n]
Plums & Prunes	0		952.4	99.1	100.0	99.1			146.5
Strawberries	0		1,011.9	387.6	100.0	387.6			306.64
Watermelons	26,600.0	1,381.0	6,547.5	339.8			75.4	1,041.3	467.68
Citrus Fruits[o]	NA		14,166.2	6,233.2					NA

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DELAWARE FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION						
	Retail Weight[a] (1,000 lbs)	Retail Value[a] ($1,000) (1981 dollars)	Retail Weight (1,000 lbs)	Retail Value ($1,000) (1981 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres required to produce 100% of DE Consumption
Other Fresh Fruits[p]		267.0							
Fruits, Processed									
Apples	NC		4,702.3	3,555.0					279.9
Peaches	NC		2,571.4	1,491.4					153.05
Pears	NC		1,071.4	538.2					183.7
Citrus	NA		13,225.9	21,901.7		21,901.7			NA
Fats & Oils									
Lard	884.8	99.0	1,488.0	163.7	40.5	66.3			NA[q]
Margarine	NC		6,666.5	5,266.5					
Shortening	NC		10,952.1	8,214.1					
Soybean Oil	87,434.1	48,662.0	25,297.1	15,937.2			71.0	34,550.0	76,671.82
Grains[r]									
Barley	54,000.0	1,171.0	714.3	24.6			98.7	1,155.8	321.81
Corn	539,050.6	48,547.0	9,464.1	852.4			98.2	47,694.7	2,932.4
Oats	NC		1,845.2	7.8					1,048.41
Rice	NA		5,595.1	615.5					NA
Rye	5,376.0	192.0	416.7	20.5			92.3	177.0	310.04
Wheat	44,347.8	3,450.0	71,308.0	6,806.3	37.8	2,603.8			48,237.65
Sugar	0		53,153.6	669.7	100.0	669.7			1,355.96
Maple Syrup	NC		59.5	760.9					NA
Honey	128.0	95.0	714.3	530.0	82.0	434.6			NA
Coffee, Tea, Cocoa	0		6,904.6	33,034.6	100.0	33,034.6			NA
Tree nuts	NC		1,011.9	414.9					
Peanuts	0		4,047.5	837.8	100.0	837.8			NA
TOTALS	1,981,873.4	373,545.0	766,280.5	298,076.07		130,956.77		294,751.9	247,043.13

Notes:

a. Most retail weights, retail values, and production per acre figures are taken from one of the following sources: Raymond C. Smith, *Delaware Farm Income, Crop and Livestock Production, 1979*, University of Delaware Agricultural Experiment Station, Newark, DE, A.E. Pamphlet No. 71, Feb. 1981. *Dimensions on Delaware, A Statistical Abstract for 1979*, Office of Management, Budget, and Planning, Dover, DE, Sept. 1980, Document # 10-03/80/09/02. *Agricultural Statistics 1980*, USDA, Washington, D.C.

b. Consumption figures are taken from USDA Statistical Bulletin No. 672, *Food Consumption, Prices, and Expenditures, 1960-1980*.

c. Based on 3.2 lbs. corn plus 10.1 lbs. silage needed to produce one lb. beef (University of Delaware, College of Agriculture).

d. Computed from formula, p. 18 of *The State of Your Food, A Manual* for *State Food Systems Analysis*, Cornucopia Project, Rodale Press, Emmaus, PA.

e. Based on 2 lbs. corn per 1 lb. chicken (University of Delaware College of Agriculture).

f. Based on 2½ lbs. corn per 1 lb. turkey (University of Delaware College of Agriculture).

g. 130 million eggs.

h. Weights and retail values of seafood were supplied by the Department of Natural Resources and Environmental Control, Division of Fish and Wildlife, Dover, DE.

i. Not applicable.

j. A "not applicable" label was given to land requirements for all dairy products because Delaware does not have the quality of grazing land that it needs to support dairy farming to a self-sufficient level. (University of Delaware College of Agriculture).

k. Not collected. Delaware does have a cheese processing plant but it is believed that the milk is imported from Pennsylvania. No figures on cheese production were available.

l. Includes sweet potatoes, broccoli, brussels sprouts, cabbage, carrots, cauliflower, green peppers, spinach, and miscellaneous vegetables.

m. Figures for apple and peach production are based on orchards at least three years old, with 140 trees per acre producing 3 bushels of fruit per tree. (Kent County Cooperative Extension Service, Dover, DE).

n. Computed from Pennsylvania figures (Cornucopia).

o. Includes oranges, grapefruits, and lemons.

p. Includes strawberries, and miscellaneous fruits and nuts.

q. Not applicable. Lard is a by-product of pork processing.

r. Total production figures of grains were used to convert to flour and other food products. The figures show Delaware's potential for human food production in grains.

s. Sugar from beets.

Delaware Organizations List

There are many organizations which directly or indirectly are working towared developing a sustainable food system in Delaware. The following is a selective list of organizations working with consumers, farmers, and the food industry in Delaware.

Delaware Agriculture Museum Association
866 N. DuPont Highway
Dover, DE 19901
(302) 734-1618

Delaware Association of Conservation
Districts
Agricultural Hall
University of Delaware
Newark, DE 19711
(302) 738-2506

Delaware Bankers Association,
Agricultural Committee
Robert F. Rider
O. A. Newton & Son Co.
Box 397
Bridgeville, DE 19933
(302) 337-8211

Delaware Beekeepers Association
John Landon, Secretary-Treasurer
R.D. #2, Box 56
Milton, DE 19968

Delaware Cooperative Extension
Service
Dr. Samuel M. Gwinn, Director
Agricultural Hall
University of Delaware
Newark, DE 19711
(302) 738-2504

Delaware Department of Agriculture
Donald J. Lynch, Secretary
Drawer D
Dover, DE 19901
(302) 736-4811

Delaware Farm Bureau
233 S. DuPont Highway
Camden, DE 19934
(302) 697-3183
John F. Walton, President
R.D. #1, Box 117
Magnolia, DE 19962
(302) 697-6960

Delaware Federal Land Bank
Association of Delaware
S. State Street & Rt. 13
P.O. Box 418
Dover, DE 19901
(302) 734-7534

Delaware State Grange
911 S. Governors Avenue
Dover, DE 19901
(302) 734-4653

Delaware Council of Farm Organizations
Joseph Jackewicz, Sr.
R.D. #1, Box 144
Magnolia, DE 19962

Delaware Council of Farmer Cooperatives
Fred C. Riblett
47 Tischer Dr.
Dover, DE 19901
(302) 697-2589

Delaware Crop Improvement Association
William Hutchinson, President
P.O. Box 222
Clayton, DE 19938
(302) 653-7111

Delaware Produce Growers, Inc.
Joseph Jackewicz, Sr. President
R.D. #1, Box 144
Magnolia, DE 19962
(302) 697-7681

Delaware Vegetable Growers Association
Ed Kee, Secretary-Treasurer
P.O. Box 340
Dover, Delaware 19901
(302) 736-1448

4-H Leaders Association
Mr. Rodney Reynolds, New Castle, Pres.
R.D. #1, Box 242
Smyrna, 19977
(302) 653-8729

Mrs. Rose Pritchett-Kent, President
R.D. #2, Box 306
Felton, DE 19943
(302) 284-4437

Mrs. Joy Huskill-Sussex, President
R.D. #5, Box 150
Harbeson, DE 19951
(302) 945-0820

Governor's Council on Agriculture
Earle Isaacs, Chairman
R.D. #1, Box 417
Ellendale, DE 19941
(302) 684-4526

Mid-Atlantic Food Processors Association, Inc.
P.O. Box 2497
Salisbury, MD 21801
(301) 546-5854

Delaware Directors:

Nazmy Elehwany
DelAgra Corp.
Bridgeville, DE 19933
(302) 337-8206

Will James
Draper-King Cole, Inc;
Milton, DE 19968
(302) 684-8555

Peninsula Horticultural Society
Wayne V. Shaff
Quantico Road
Salisbury, MD 21801

Southern Delaware Truck Growers Association, Inc.
Dual Highway & Georgetown Road
Laurel, DE 19956
(302) 875-3147

State Farmland Evaluation Advisory Committee
Dr. Donald F. Crossan
133 Agricultural Hall
University of Delaware
Newark, DE 19711
(302) 738-2501

University of Delaware College of Agricultural Science's and Experiment Station
Dr. Donald F. Crossan, Dean and Director
Agricultural Hall
University of Delaware
Newark, DE 19711
(302) 738-2501

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The Cornucopia Project

1982

THE NEW MEXICO FOOD SYSTEM:
TOWARD ABUNDANCE IN THE LAND OF ENCHANTMENT

A Study of the Food System of New Mexico

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with

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Preface

This report is a product of a study on New Mexico's food system. You ask: What's a food system? It's more than you might think; it goes far beyond the food production which takes place on the farm. The system includes the processing, distributing, marketing and consumption of food. Not to be left out are all the industries that help put food on our tables: manufacturers of equipment, chemicals, and packing materials are just a few. (See Chart 1). Finally, there's the energy foundation for the whole system: fossil fuels.

Here at the Cornucopia Project we've discovered much about our food system. It currently provides us with an abundance of food and a degree of choice unsurpassed anywhere else in the world. But to produce this abundance and degree of choice, we are using up our natural resources: soil, water, and energy. In the midst of plenty, we seem bent on devastating our potential for future productivity. These problems are not unique to New Mexico's food system; in fact, they are seen throughout the United States. They are of national and international magnitude.

Our purpose is not to paint hopeless pictures of a ravaged earth, but to point out the vulnerabilities and strengths of our food system. From there, we suggest some steps we can take to insure a sustainable and affordable supply of food, for ourselves, our children, and their children.

Chart #1

Soil
Water
Minerals

Food Production

modern agriculture
organic agriculture
animal husbandry
aquaculture
greenhouses
hydroponics
urban food production

Food Processing

drying
cooling
freezing
freeze drying
canning
smoking
salting
pickling
aging
preservatives
heating/cooking

Food Storage

root cellar
spring house
ice box
freezer
refrigerator
grain bin
silo, barn
warehouse
cans, bins

Food Distribution

truck
rail
ship, barge
airplane
car
bicycle
conveyor belt
pipe
animals
humans

Food Procurement

buy
trade
gift
grow
wholesale/retail
grocery store
supermarket
roadside stand
market stall
food coop
garden
restaurant

Food Preparation

boil
simmer
broil, braise
bake
barbecue
fry
freeze
roast
steam
parboil
reheat

Source: Adapted from Medard Gabel, Ho-ping: Food for Everyone (Garden City: Anchor Press/Doubleday, 1979).

INTRODUCTION

When Spanish explorers first arrived in New Mexico in the 1500's, they came upon the self-sufficient agrarian culture of the Pueblo Indians. In the 1850's, at the time of the United States' conquest of New Mexico, the area still had a self-supporting agrarian economy. Even to the present day, our own perception of belonging to a farming and ranching society has persisted. We take pride in living in the Land of Enchantment.

New Mexico of the 1980's, however, is a different place. Seventy percent of the state's populace lives in urban areas;[1] a third resides in greater Albuquerque. Our 1980 population of 1.3 million was 27.8 percent higher than the 1970 head-count.[2] We are no longer an agrarian society, despite our self-perception. Now, the center of the state's economy is mineral and petroleum production and federal government expenditures,[3] generating 3.5 to 5 times more revenue than agriculture.[4]

New Mexico still has a productive agriculture: Cash receipts for New Mexican farmers and ranchers totalled $1.85 million in 1980.[5] We lead the nation in chile pepper production.[6] We grow crops of national importance: pecans, peanuts, sorghum grain, lettuce and onions.[7] However, it is New Mexico's livestock industry that plays the largest role in the state's agriculture. Even though sales of cattle and calves generate over 60 percent of the state's total cash receipts from agriculture, New Mexico's national role in cattle is insignificant.[8] Our herds make up only 1.3 percent of the total number of cows and calves in the country.[9]

Despite the productivity, New Mexico's agricultural and food systems are in trouble. Over 56 percent of the food consumed in the state is imported from other states and countries.[10] Meanwhile, our own productive potential is being undermined by soil erosion, cropland loss, and diminishing water supplies. New Mexico has the nation's second worst rate of rangeland erosion and fourth worst rate of cropland erosion.[11] Between 1967 and 1977, New Mexico lost 100,000 acres of prime farmland to development; only slightly more than one-half million acres remain.[12] Sixty percent of the state's irrigated cropland is supplied with water from underground sources called aquifers,[13] and like the Ogallala Aquifer on the East Plains, these aquifers will be dry early in the next century unless present use rates are changed.[14]

It appears that these trends will make New Mexico even more dependent on out-of-state sources of food. At the same time, however, these sources of food are becoming less reliable and more expensive. If New Mexico is to build a strong and affordable food system and prevent disruptions of its food supply in the future, major changes must be made.

THE DISTURBING FACTS

New Mexico's agriculture produces over $1.1 billion a year in farm cash receipts; 87 percent of this is generated by only seven enterprises: cattle and calves, dairy, hay (mainly alfalfa), cotton, wheat, sorghum, and chile.[15] This lack of diversity is one of the major causes of our state having to import over 56 percent of its food. Yet while we import vast amounts of food, we export much of what we produce: cattle, sheep, dairy products, lettuce, onions, chile, peanuts and pecans.[16] New Mexico's farmers also harvest vast amounts of grain and other crops (Chart 2), but except for wheat (and possibly sunflower seeds), these crops are used for livestock feed.[18] While the single fact that we import over half of our food may not be alarming in itself, current practices and trends in the state's agriculture will not only increase our food dependence on other states, but will also threaten present agricultural production as well.

Loss of Farmland

It is hard to grow food without good land, and New Mexico is losing its cropland base, particularly irrigated cropland. While 82 percent of the state's 77.9 million acres is used for grazing livestock, less than 3.5 percent is in cropland, and only half of that is irrigated.[18] Between 1967 and 1977, 100,000 acres of prime farmland -- the best type of farmland -- were converted to urban uses. Only 524,000 acres of prime farmland remain, and if this conversion rate continues, no prime farmland will remain in 2030.[19]

Although New Mexico keeps losing prime farmland, the number of acres of cropland in the state actually increases. This occurs because new cropland is brought into production. The new cropland is not only of less than prime quality, but also in dwindling supply. Less than 500,000 acres of land having a high potential for conversion to cropland remain.[20]

Chart #2

New Mexico Grain and Feed Production

Crop	Production
Corn	7,225,000 bu.
Wheat	10,500,000 bu.
Barley	1,995,000 bu.
Sorghum	10,280,000 bu.
Oats	174,865 bu.
Rye	8,667 bu.
Sunflower seed	326,080 lbs.
Soy Beans	59,550 bu.
Corn silage	364,000 tons
Sorghum silage	138,000 tons
Alfalfa	132,000 tons
Other hay	112,000 tons

Sources: New Mexico Agricultural Statistics 1980 (Las Cruces: New Mexico Crop and Livestock Reporting Service, 1981), p.14; U.S. Department of Commerce, 1978 Census of Agriculture, Vol. 1, part 51 (Washington, D.C.: GPO, 1981), p. 415.

Decline in Number of Farms and Farmers

The number of farms in New Mexico has also dropped. Since 1935, two out of every three farms have gone out of business. Until 1975, there were only 12,000 farms left in the state. Since then, there has been an increase in the number of farms of over 13 percent, to the 1981 figure of 13,600 farms.[21] (Chart 3).

Although overall the number of farms has been decreasing, the size of New Mexico farms has actually increased. Between 1935 and 1941, farm size increased 400 percent, from 832 acres per farm to a high in 1974 of 4,170 acres.[22] Since then, average farm size has dropped almost 20 percent. (Chart 4). Part of the increase in farm size reflects increasing use of rangeland, which has limited productivity and requires careful management.

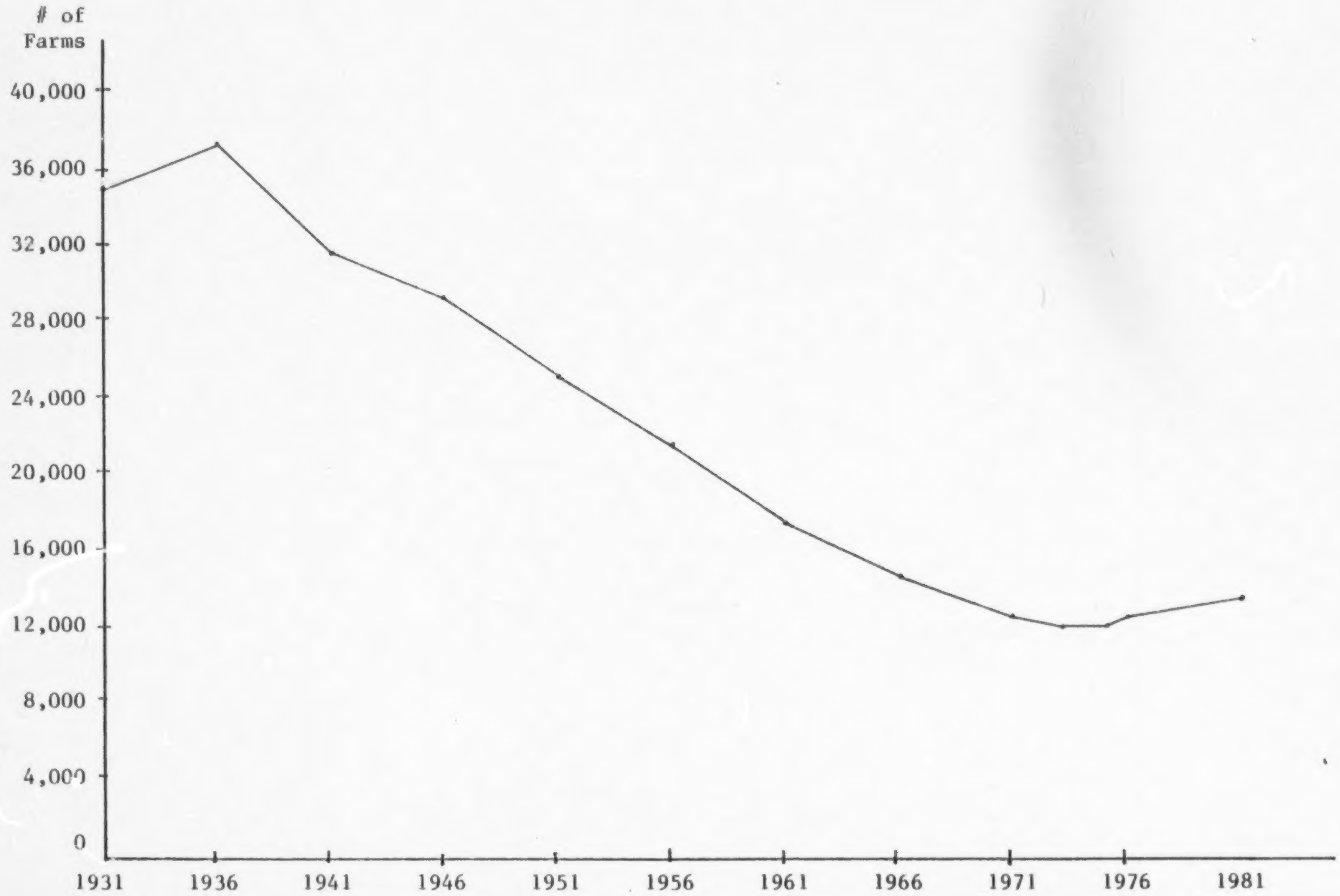
The full-time farmer is becoming a thing of the past. Fewer than half of the farm operators in New Mexico list farming as their principal occupation. Because of the poor economic climate of the last several years, many farmers have been forced to find part-time employment off the farm in order to make ends meet. Young people are discouraged from entering farming because of high start-up costs, uncertain economic conditions, and an array of health risks that make farming an economically and physically hazardous occupation.[23]

Farm Economics

Economically, farmers are in terrible shape. Farm income, in real dollars, is thought by some economists to be at its lowest point since the Depression.[24] And as real income drops, farmers' debts grow larger. Between 1960 and 1980, the farm real estate debt in New Mexico grew 480 percent to a record of $637 million (Chart #5).[25] By January 1981,

Chart #3

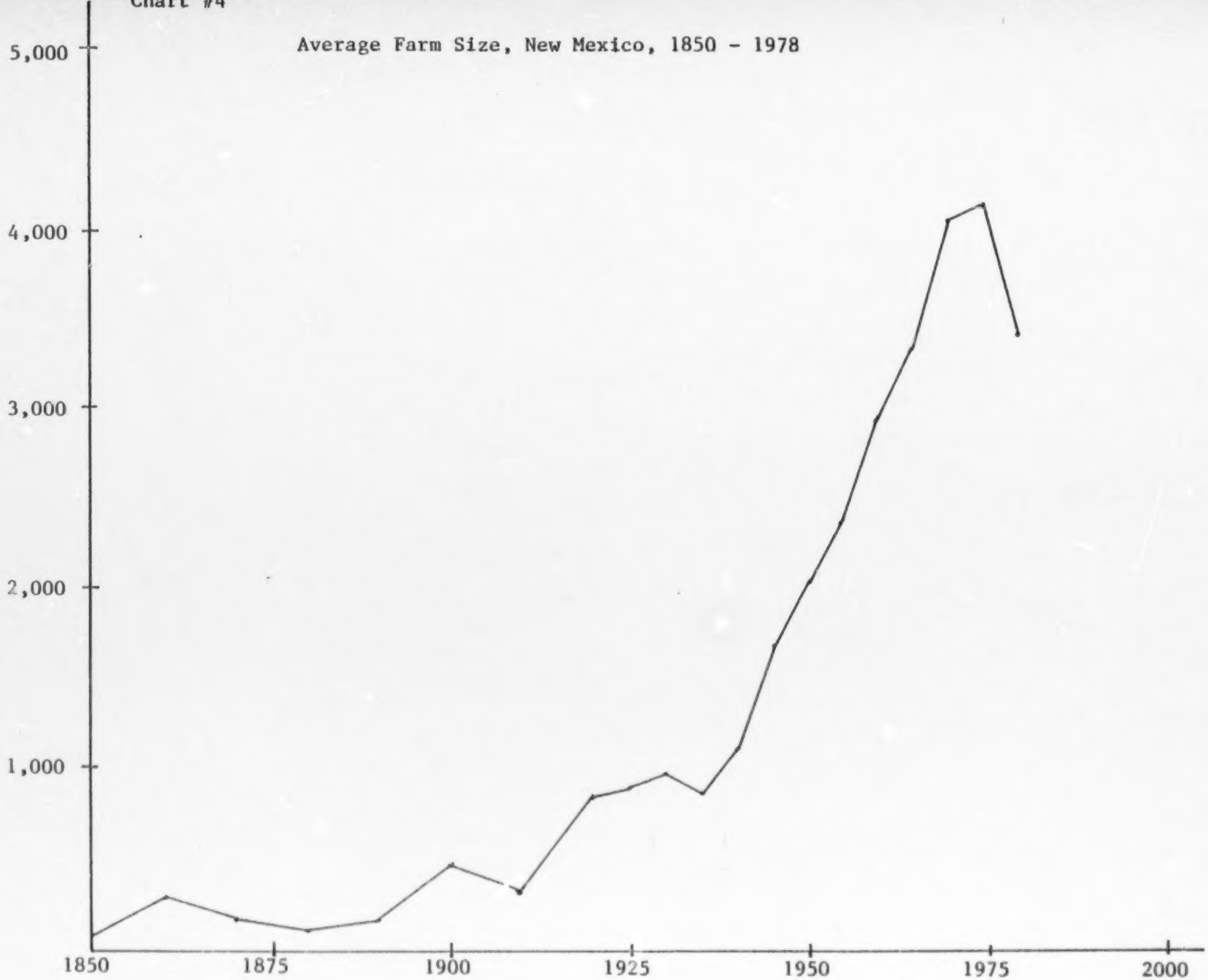
Number of Farms in New Mexico, 1931 - 1981



Sources: New Mexico Agricultural Statistics 1979, p. 18; New Mexico Agricultural Statistics 1980, p. 11.

Chart #4

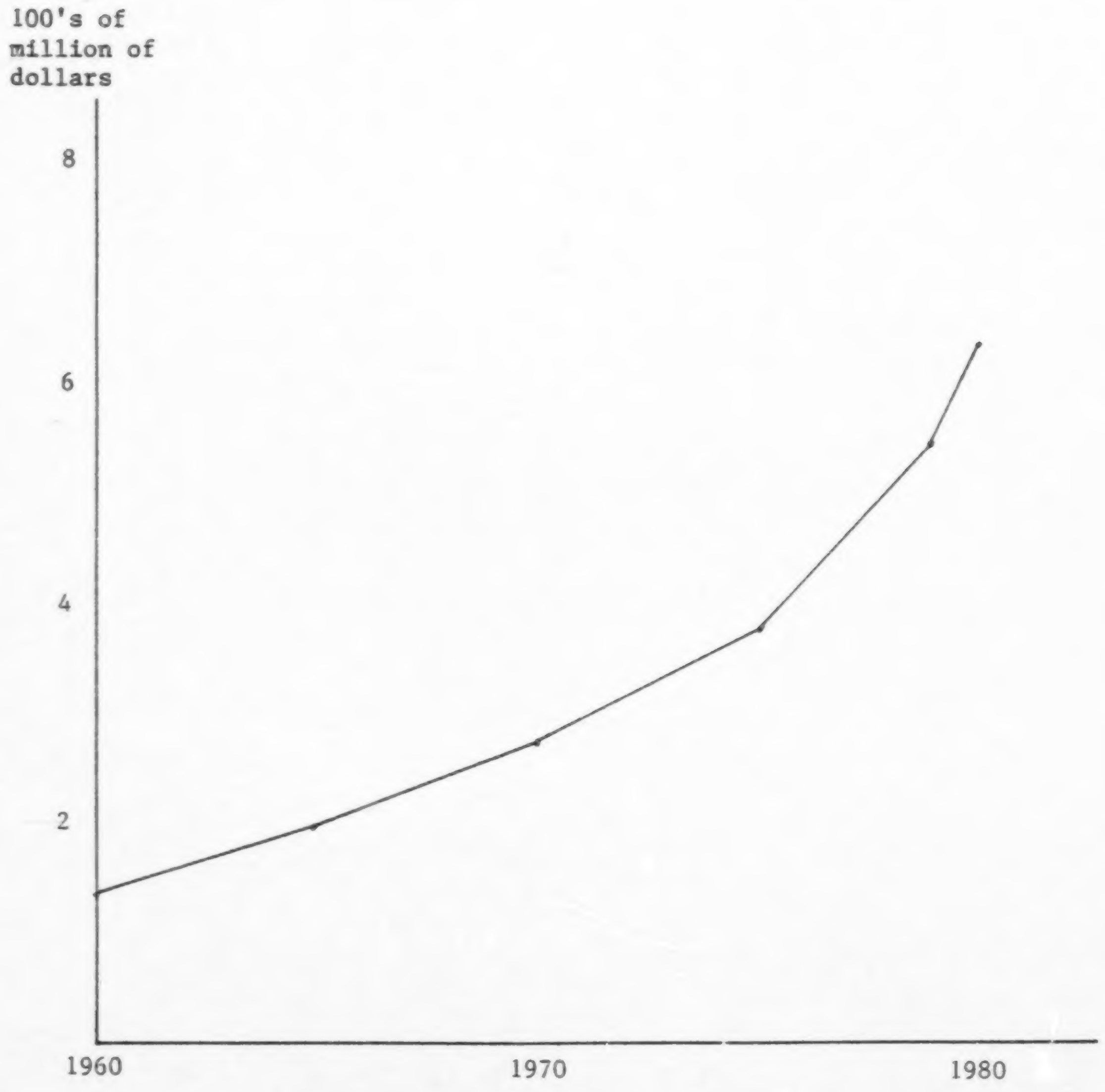
Average Farm Size, New Mexico, 1850 - 1978



Sources: Historical Abstract of the United States, Colonial Times to 1970 (Washington, D.C.: GPO,), p. 461; 1978 Census of Agriculture, p. 411.

Chart #5

New Mexico Farm Real Estate Debt
1960 - 1980



Sources: USDA, Agricultural Statistics 1980 (Washington, D.C.: GPO, 1981), p. 477.

the total farm debt in the state reached $1.19 billion,[26] an average of $87,000 for each farm in the state.

Even when farmers grow a good crop, they often cannot afford to harvest it. Although yields of 30 tons per acre for lettuce are feasible in the state, only around 10 tons of lettuce per acre is what the farmer actually harvests because he cannot afford to have the rest of the produce picked.[27] Meanwhile, the farmworkers who pick the lettuce received an average work-wage in 1980 of only $2.95 an hour, hardly a "comfortable" living.[28]

Javier Vargas, the Doña Ana County Agricultural Extension Agent, expresses well the connection between the economic problems of farmers and farmland loss in saying that in the Mesilla Valley, houses had become the farmer's best crop.[29]

Soil Erosion

Loss of topsoil, although less obvious than loss of farmland, is nonetheless a severe problem in New Mexico. The state's rangeland loses 8.3 tons of soil from every acre each year, the second worst rate in the country.[30] Cropland loses 13.34 tons per acre every year, the fourth highest rate in the country.[31] Agriculture is not sustainable with erosion rates this high; the U.S. Department of Agriculture (USDA) estimates soil erosion must be below 1 to 5 tons per acre per year to maintain soil productivity.[32] It take 300 to 2,000 years for nature to form an inch of New Mecixo's cropland soils; these soils are currently being eroded at rates of one inch every 13 years.[33]

To put New Mexico's erosion problem into perspective, think about these two facts. For every pound of wheat that is grown in New Mexico, four pounds of soil are eroded.[34] And if all the eroded soil from nonfederal agricultural lands was piled inside the city limits of Santa Fe, the town would be buried by nearly 10 feet of topsoil every year.[35]

These excessive rates of soil erosion continue despite our efforts to control them. In fact, the nationwide loss of soil per acre to wind and water action is worse today than it was during the Dust Bowl years of the 1930's.[36] As an editorial in Crops and Soils stated, "technology has...masked today's erosion problem" often with energy-intensive inputs such as fertilizers, pesticides and irrigation.[37] These inputs have allowed us to harvest larger and larger yields from a diminishing soil base.

The cost of these inputs is already high and growing astronomically. One estimate states that for every acre-foot of soil eroded, 8,000 pounds of nitrogen and 2,000 pounds of phosphorus (as well as 2 inches of water storage) are lost.[38] This would mean that New Mexico is losing 64,600 tons of nitrogen and 16,150 tons of phosphorus from its crop and pasture lands annually.[39] The cost of commercial fertilizers to replace these two primary nutrients would be $55 million.[40] Also, an equivalent of 900 acres could be irrigated with this loss of water storage capability.[41]

A more direct cost of soil erosion is sedimentation. Currently the U.S. Bureau of Reclamation is working on a proposal to replace Lake McMillan on the Pecos River with a new dam. A major reason behind the Brantly Project is that at least 63 percent of McMillan's original storage capacity is now filled in with eroded silt.[42] Brantly would cost $221 million and innundate 2,300 acres of irrigated cropland with its pool.[43] Other reserviors face similar situations: silt has already filled 36 percent of Lake Sumner, 20 percent of Elephant Butte, and 17 percent of Conchas Lake.[44]

Irrigation

Perhaps a still larger threat to New Mexico's agriculture involves the problems of irrigation. In 1975, irrigated agriculture accounted for

82.5 percent of all water withdrawals and 85 percent of total water consumption in the state.[45] Irrigation also uses an estimated 78.5 percent of the total energy New Mexico agriculture consumes.[46] Withdrawals from surface and groundwater supplies were split nearly equally.[47] Irrigation with surface waters has been practiced for hundreds of years, but the exploitation of groundwater is a fairly recent practice that now accounts for 60 percent of all irrigated land.[48]

Curry County exemplifies this trend. In 1940, Curry County had no irrigated land, yet by 1980, 222,080 acres had been developed, all irrigated with groundwater.[49] Unfortunately, this groundwater is being pumped out of the ground faster than it is being replaced, and in 20 to 40 years, Curry County will be without irrigated land once again.[50] In 1980, less than 70 percent of Curry's irrigated land was planted: nearly 70,000 acres were left idle or "fallowed".[51] In fact, any place in the state where groundwater development takes place away from major rivers can be considered the mining of a limited resource that will eventually dry up.[52]

An increase in energy prices could accelerate the decline in groundwater irrigation: the cost of energy to run the pumps could become prohibitively expensive. When natural gas prices jumped in 1973, agriculture in Pecos, Texas came to an abrupt halt: twelve of fifteen cotton gins and nearly a thousand farmers went out of business.[53] A similar jump in prices could occur again, especially with a decontrol of natural gas prices, and the effects would not be limited to farmers. Whole communities such as Clovis and Portales are tied to the agricultural economy, and the collapse of related industries such as farm equipment dealerships and food processors could lead to serious economic and social problems.

Threats to New Mexico's water come from out-of-state as well. El Paso, Texas has brought a lawsuit against the state in an attempt to overturn a New Mexican law prohibiting the export of New Mexican groundwater. If El Paso succeeds, then water supplies would be affected not only in Doña Ana County where El Paso hopes to drill its wells (Doña Ana leads New Mexico in crop production[54]), but also anywhere else in the state where demands for out-of-state destined groundwater exist. Coal companies would be free to use groundwater to operate slurry pipelines.

The quality of New Mexico's water also faces problems. Due to overdrafts from aquifers, saline groundwater will soon be drawn into wells in Eddy County and the Estancia and Tularosa Basins.[55] At present, salinization of irrigated cropland is seen as an inconvenience which can be contained with good practices and management. That is because New Mexican farmers still flush out the concentrated salt build-up in their soil with excess irrigation water. This practice, however, has led to widespread contamination of groundwater in shallow aquifers.[56] Salinization could become a greater problem in the future if care is not taken to decrease it.

A subtle, yet extremely important threat to New Mexico's future water supply is the loss of forestlands in the state. Between 1967 and

1977, New Mexico's nonfederal forest lands decreased 63 percent, from 9.3 million acres to 3.4 million acres.[57] Forests have long been identified as watershed sources, and their demise might have grave consequences for the state's future water supply and climate.

Fuels and Fertilizers

The threats to New Mexico's land, soil, and water are real, but they are not the only problems facing New Mexico agriculture. The current system also relies on fertilizers and fossil fuels, and the future prices and relative abundance of these inputs are uncertain.

New Mexico produces 83 percent of the country's potash production and 34 percent of its total consumption,[58] yet we consume only 1 percent of our production in-state.[59] The remaining 99 percent of this fertilizer is used in other states or exported to countries such as Japan, Brazil, and New Zealand.[60] Conservative estimates place New Mexico's potash reserves in the 40-50 year range,[61] and although the ending of potash production will have little effect on New Mexican farmers (since they use little potash), the economy in the southeastern part of the state as well as farmers in other areas will feel the effects. Two-hundred seventy-five employees of one potash producer were put out of work when the company suspended operations earlier this year.[62]

New Mexican farmers do use phosphorus -- 21,357 tons of phosphate in 1979. Domestic phosphorus supplies are being depleted faster than potash supplies.[63] Like potash, phosphorus production is centered in one area of the country. Central Florida produces 75 percent of the United States' phosphorus, yet its currently mineable reserves will be exhausted by 2010.[64] The United States may soon have to become a net importer instead of an exporter of phosphorus, resulting in increased costs and less secure supplies.

Energy and petrochemical use in agriculture is nearly synonymous; irrigation, fertilizers and pesticides account for 85 percent of the energy consumed in New Mexico agricultural production.[65] Yet *under current practices*, little energy conservation could be undertaken by a farmer who wished to maintain yields; a USDA study shows that even a doubling of energy prices would result in only a 5 percent reduction of total energy-use by farmers.[66] The same study also estimated that a 10 percent reduction in energy supplies "would lead to a 55 percent increase in raw commodity prices."[71] Ed Wheeler, President of the Fertilizer Institute, recently said that decontrol of natural gas prices could drive the cost of ammonia, a common nitrogen fertilizer, from $80 a ton to as high as $500 a ton.[68]

Due to the high energy demands of irrigated agriculture, New Mexico's agriculture is particularly vulnerable to shortages and rising energy costs. But the production sector is only one part of the food system. The USDA estimates 5 percent of our total retail food bill is for transportation costs.[69] This means that in 1980 we spent nearly $78 million (of our total food expenditure of $1.56 billion) on transportation.[70] Even though they are an inefficient mode of transportation,[71] trucks now ship most of our foodstuffs: 100 percent of all livestock, 88.2 percent of all fresh produce, and 63.8 percent of all processed food.[72] A trucker's strike or shortage of fuel would slow down or halt not only our food imports, but also the exports of cash crops upon which our current agricultural economy depends.

Trucks are far more destructive to our highways than most people realize. A report by the U.S. Comptroller General claims that one 80,000 pound truck does the same damage to an interstate highway as at least 9,600 cars.[73] Each *week*, New Mexico's highways are subject to over 700 trucks bringing food into the state, 378 trucks exporting food out of the state, and 697 trucks hauling cattle and calves in and out of the state. This total of 1,687 trucks rolling down New Mexico's highways does not include thousands of trucks hauling food from California and Arizona to the rest of the country.[74]

WHAT DO THESE FACTS MEAN?

Current trends in New Mexico's agriculture paint a bleak picture for future in-state food production, and a decrease in food production means that in the future we will increase our food imports from other states. Although this system gives us a year-round availability of many types of food, the dependence on out-of-state events and food sources it creates has two main disadvantages: 1) our food supply is insecure and particularly vulnerable to disruption; and 2) our local economy is weakened.

Vulnerability: Our food supply-line can be cut. During the fuel shortage in 1979, some food distributors came within a day or two of not having enough fuel to deliver food; in some parts of the country, a food shortage was only days away.[75] Energy shortages, however, are not the only threat to our supply of food. Other events could slow down or cut off our food pipeline: strikes by truckers, pickers, or other food industry employees, natural disasters such as insect infestations or weather-related phenomena, and political events. In July 1981, the Mediterranean Fruit Fly nearly caused a quarantine of California produce, and in the following winter, the "White Fly" wreaked havoc in the state's lettuce fields.[76] Fortunately, the effects of these infestations were minimal, but this does not rule out the possibility of a new kind of pest or blight causing the same or a more severe problem another year.

California currently supplies the country with 40 percent of the fresh fruits and vegetables and 25 percent of all table food consumed,[77] yet the state's ability to export such vast quantities of food in the future is in question. A University of California study foresees a change in the state's agricultural production in noting that: "California's enviable position in agricultural productivity has been built upon relatively inexpensive energy inputs and available supplies," and that "...most of California's best farmland lies within counties designated as Standard Metropolitan Statistical Areas."[78] The 'California connection' may be a less dependable food source than we think, and certainly one we should count on less in the future.

Weak Economy: In 1980, New Mexico had a food import/export deficit of over $450 million.[79] Importing so much food depresses our economy in terms of both dollars and jobs. Higher food prices due to escalating transportation costs are felt every time we pass through the check-out stand at the food store. Increasing local food production would not only decrease transportation costs, it would also create local jobs in the growing, processing, distributing, and marketing aspects of the food system. For every dollar collected in farm income, an additional \$2.20 is generated in the regional economy.[80] Producing more of our food locally would enhance our local economy.

WHAT CAN WE DO?

The facts about New Mexico's food system are alarming, but the situation is not hopeless. One of the main factors behind New Mexico's various food problems is a lack of clear-cut, long term planning and goals. If such planning and goals were developed, there would be many things that New Mexicans -- farmers, consumers, business people, educators, researchers, and government officials -- could do to create a food system that would best serve their needs. We believe such a food system should be productive, dependable, sustainable, safe, efficient, equitable and self-reliant.

A productive New Mexico food system would give every person in the state access to adequate food -- adequate in quantity, quality, and degree of choice. A dependable system would provide all New Mexicans with a reliable food supply, free from economic, political, or environmental disruption. A sustainable system would insure that cultural, economic, and environmental conditions of food production, processing, and distribution would permit the food system to be productive indefinitely despite possible changes in climate, availability of resources, and other factors. Safe food means the food system should not harm workers, consumers, or the environment. An efficient system would make the most appropriate use of energy, water, soil nutrients, labor, and other resources. An equitable system should generate sufficient income for the rural sector to provide a standard of living equivalent to that of other sectors of the economy and to maintain vigorous rural communities while enabling farmers to fulfill their land stewardship responsibilities.

The final term, self-reliant, should not be confused with self-sufficient; we are not necessarily saying that New Mexico should produce all of its own food. Many popular food items we consume, such as oranges, bananas, coffee, tea and cocoa, cannot be grown in the state. This does not mean self-reliance should not be examined. Increased self-reliance should be a goal, because it would bring us less costly and higher quality food, a stronger local economy, and a food sytem which would be better prepared for a decrease or cutoff of the food and other resources we currently import from other states.

In order for New Mexico to increase its self-reliance, we need to start producing more of the food we eat. In 1980, New Mexican farmers had 1,084,060 acres of irrigated cropland and 658,510 acres of dry cropland in production (of a total cropland base of 2.5 million acres).[81] At the same time, it appears that 363,000 irrigated and 1,737,394 dry acres of cropland could supply us with 100 percent of our consumption of those foods that it is climatically feasible to produce in the state.[82] Yet despite our ability to grow most of what we eat, the trend in New Mexican agriculture is to produce export-oriented items: cotton, chile, pecans, lettuce and onions (which both enter nationwide markets), and beef. Export products, however, are subject to price and demand fluctuations, and they increase our dependence on other states and countries. New Mexican farmers and ranchers could do much to alleviate this dependence by producing more foods New Mexican consumers desire.

Due to our vast amounts of rangeland, the New Mexico beef industry can produce enough beef for in-state consumption, and still provide enough for export. But the industry has had its share of problems in recent years. Nationwide per capita consumption of beef dropped 19 percent from 1976 to 1980, from 94.4 lbs. to 76.5 lbs.[83] Over the same time period, the average beef price increased over 56 percent.[84] To our ranchers' chagrin, beef is being passed up by consumers because they see it as full of expensive fat.[85] One solution to change this lack of demand is for ranchers to give the consumers what they want: lean beef.[86]

New Mexico is particularly well suited for raising leaner beef. Due to our relatively mild climate, open range is available throughout the year.[87] Ranchers can save money and energy by using native grasses instead of grain to put weight on their stock.[88] Leaner beef would not only give consumers what they want, but it would also free up large amounts of cropland currently producing feed grains. This land could be put to use growing more food for direct human consumption.

Changes in the USDA beef grading standards could help accelerate the move to leaner beef, yet they aren't a necessary first step. New Mexican ranchers can reach out to new markets on their own and with the help of the New Mexico Beef Council. Direct marketing to consumers and restaurants is a good place to start.

We could immediately increase our production of vegetables. Currently we import 53 percent of the fresh vegetables we consume from as far away as California, Illinois, and Florida. It would require 29,000 acres of irrigated cropland to grow all of the fresh vegetables consumed in-state, while less than 45,000 acres would be needed to produce all our fresh and processed vegetables.[89] Vegetables are a valuable cash crop, and New Mexico's climate allows them to be grown "as good as anywhere else."[90]

Vegetables are well suited to various direct marketing methods; farmers' markets and pick-your-own establishments are two such methods. A USDA study in Colorado has found that both farmers and consumers benefit from direct marketing: farmers received returns 44 percent higher than they would through wholesale channels, and consumers paid 28 percent less than supermarket prices.[91]

Currently, seven farmers' markets operate in New Mexico.[92] This could be greatly expanded. Albuquerque's market is open only twice weekly, at only one location and the future of its location is in question due to the city's plans to build a mall at its present site.[93] Incorporating the present farmers' market into the planned mall, as well as setting up locations in other parts of the city would help both farmers and consumers. Other possibilities for founding new markets and expanding existing ones should be explored.

Another market for farmers is within the current system of wholesalers and grocery stores. Although breaking into the chain grocery stores can be very difficult, at least one wholesaler in the state is looking for more local produce in order to decrease imports from California.[94] Developing cooperatives to sell produce (as well as other foodstuffs) to grocery stores, restaurants, and institutions should be utilized by growers to sell their production. In-store signs identifying locally grown foods could encourage consumers to buy local foods.

In the end, much of the burden to increase local production falls onto the consumer; a farmer won't grow a crop unless he can sell it. As New Mexico consumers, we must start consuming more New Mexico produced foods. Contacts with farmers should be developed, and bulk purchases of in-season foodstuffs for preserving should be undertaken. Also, minor seasonal changes in diet could increase consumption of local foods. By substituting locally-grown cold-storage vegetables (such as carrots, potatoes, cabbage and winter squash) for imported vegetables (such as tomatoes, lettuce, and celery) during the winter months, we would reduce our reliance on California vegetables and help our own farmers and economy. (Chart #6).

Consumers can increase their self reliance, and save money doing so. Home gardens can provide a wide variety of fresh vegetables at a very low cost. In 1980, 23 percent of the households in the Far West had vegetable gardens.[95] Each garden yielded an average of 588 pounds of vegetables, worth $460.[96] Since the cost of a garden is low -- $19 for seeds, tools, fertilizers, and pesticides -- the gardener "makes a profit" of $441 in fresh vegetables, and has the added benefits of a little exercise and relaxation.[97] If half of all New Mexican households had vegetable gardens, over 60 percent of the state's fresh vegetable consumption could be met.[98] This is not an unrealistic figure, for it is estimated that 33 percent of New Mexico area households would like to have gardens, but don't have access to land.[99]

For those hesitant to start gardening, the New Mexico State University Cooperative Extension Service has published a guide to help gardeners, identifying over 40 vegetables which can be grown in the state.[100] Alternative methods of food production, such as solar grow frames, greenhouses and indoor sun rooms, are initially more expensive than conventional gardens, but they pay for themselves by producing fresh vegetables throughout the year.

In addition to producing more of what we consume, we could strengthen our food system by increasing our self-reliance of nitrogen and phosphorus fertilizers. If we made use of the nitrogen and phosphorus in economically collectable livestock and poultry manure in the state, we could produce 26.5 percent of the nitrogen and 52 percent of the phosphorus consumed in-state.[101] A bonus is that animal and human wastes can be used for methane gas production before being applied to fields.

The Navajo Indian Tribe should reevaluate the direction in which the Navajo Indian Irrigation Project (NIIP) is headed. Originally planned to encourage small farmers, the project was later placed in the hands of a corporation specializing in international agricultural systems such as plantations.[102] NIIP now has 45,000 acres under irrigation with plans to expand to 110,000 acres,[103] this expansion representing the remaining undeveloped surface water rights in the state.[104]

NIIP characterizes the import/export syndrome of New Mexican agriculture. While San Juan Valley residents must import foodstuffs like the rest of us, NIIP has geared its production to exports. The project distributes its output, mainly pinto beans and alfalfa, to other western states, as well as Mexico and Japan.[105] If NIIP were to diversify the production and develop local markets, they could supply much of the local demands and still have vast surpluses for regional exports.

Farmers and consumers can make changes on their own to increase our self-reliance. However, we still face a difficult task in finding solutions to the problems preventing us from obtaining a sustainable, dependable, and safe food system: preserving farmland, conserving water and soil, and developing new crops, markets and methods in farming are major objectives in achieving this. Farmers are too strapped financially to worry 10 to 20 years down the road; they must survive from year to year. Consumers, likewise often have little control over how our food system works. Consumers and farmers can, however, work with the government to build a stronger food system. An active role by the New Mexico State Government is needed if we hope to develop a food system with long-term viability. Fortunately, the government is financially secure enough to do this. Fiscal year 1979-1980 saw the state produce a $139.7 million surplus.[106] Also, the more than $1.4 billion in New Mexico's Permanent Fund and Severence Tax Permanent Fund could grow to over $9 billion by the turn of the century.[107]

New Mexico's financial status is good due to the state severence taxes on petroleum and mineral resource production. It is uncertain, however, it the state's tax rates are in line with other states' rates; Montana's severence tax on coal is 3 times that of New Mexico's, yet New Mexico's tax has recently been reduced.[108] Unlike New Mexico, Canada has a windfall profits tax on potash, while New Mexico copper, potash, and molybdenum producers all receive substantial tax breaks.[109] Also, most of these natural resources are consumed out-of-state; only 37 percent of the New Mexico coal-generated electricity remains in New Mexico.[110]

New Mexico could increase taxes on production of our state's non-renewable resources, particularly those exported. Just as the water in the Ogallala Aquifer is disappearing, so will our reserves of oil, natural gas, copper, potash, molybdenum, coal, and uranium. Currently the economic effects from the collapse of the oil and gas industry alone are far more worrisome to economists than the drying up of the East Plains.[111] The revenue from taxes on these depletable resources (as well as a portion of the current surpluses and money stored in banks as permanent funds) could finance the construction of a sustainable economy for New Mexico, one based on renewable resources. One foundation of such an economy is agriculture. To this end, the state govenment has a necessary role to play.

RECOMMENDATIONS FOR CHANGE

There are many different ways for New Mexico to achieve a more sustainable and self-reliant agricultural base and food system. It is not feasible in this report to examine all of our possible options, so we will focus on three: 1) an overall survey of needed state initiatives, 2) an emergency state plan for feeding New Mexicans, and 3) actions for New Mexican consumers to take for firmer control of their food supply.

1. Recommended State Initiatives:

A. Preservation of Cropland

Remaining cropland, especially prime farmland, must be protected from non-agricultural uses. New Mexico has one law that attempts this by assessing farmers on the basis of the agricultural value of their land, rather than the market value (development value). However, this land-use tax often has an opposite effect: investors can purchase farmland as a tax shelter. Although it is a start, the land-use tax alone will not succeed in protecting New Mexico's farmlands.

There are numerous ways to preserve farmland: agricultural zoning, easing of inheritance taxes, establishing a development permit system, assessing large enough capital gains taxes to deter land sales and speculation, creation of "agricultural open space" preserves or districts, or, as the French have done, grant the state "first refusal" rights on farmland being sold. The need to fit a particular method with each set of demands prohibits any generalization as to which formula would work best in New Mexico.

The USDA Soil Conservation Service has made Prime Farmland Inventories of seven counties in the state,[112] and currently is involved in a complete mapping project of prime farmland.[113] These maps should be used by community and state planners to protect prime agricultural areas from development and speculation.

One innovative proposal to protect farmland, developed by Joel Diemer, an agricultural economist at New Mexico State University (NMSU), would involve the exchange of cropland development rights for public land. The Lower Rio Grande Valley presents a problem of controlling cropland development unique to parts of the western United States. Privately owned land is limited to a narrow strip of land along the Rio Grande's floodplain, land that has historically been irrigated cropland. Meanwhile, the creosote-covered mesas overlooking the floodplain are federal land, and since this federal land is closed to development, cropland is converted to urban uses as Las Cruces and other valley communities grow.

B. Soil Conservation

A combination of incentives and disincentives might be needed to control erosion. A first step would be for New Mexico to adopt a soil conservation law similar to New York's, which requires a conservation plan for all agricultural lands over 25 acres. At the same time, the state should increase financial help for programs which encourage soil conservation and land management practices. This would include tax-breaks for capital investments made by farmers adopting practices such as strip cropping (intertillage), contour tillage, minimum and zero tillage, and increased use of crop rotation, shelter belts, and cover crops.

The USDA has determined that practicing minimum tillage techniques on 80 percent of all U.S. cropland alone would reduce cropland soil erosion by 50 percent or more.[116] Perhaps limiting the use of the moldboard plow would do more for controlling cropland erosion than any other single step. Minimum tillage also helps farmers with dry cropland because it increases the soil's water storage capacity, as well as allowing deeper root penetration.[117] Control of rangeland erosion requires better management of livestock. At present, poor management threatens 74 percent of our non-federal rangelands.[118]

C. Water Conservation

New Mexico's life blood is its water, and the state needs to develop long-range plans for using and conserving our limited water resources.

The cost of water for all users should be accurately priced. The elimination of block-rate structures (whereby the largest user of water is charged the lowest rate) would help decrease consumption. The state should also provide funds for setting up irrigation scheduling programs, and investment incentives for the adoption of drip irrigation and other water conservation equipment and programs. State-run programs should be extended to include urban consumption of water as well. Although agriculture is the largest user of water in the state, increased growth in urban areas will threaten both the quality and quantity of agricultural water supplies.

D. Production and Marketing

Greater emphasis needs to be placed on diversifying and increasinng farm production in New Mexico. Likewise, in-state markets must be developed. New Mexicans Ben Mason and Tom Clevenger have identified San Juan County and the Middle and Upper Rio Grande Valleys as lacking the infrastructure necessary to achieve their agricultural potential. Mason and Clevenger believe that the state has the responsibility to act as a matchmaker between growers, credit associations, machine operators and consumers.[119] In this role, the state could also encourage production of locally-consumed foodstuffs. A similar option is to adopt a program like the Small Farm Management Assistance Program being tried in New England. Funded by the USDA and church groups, one of the program's tasks is to help small farmers find markets.[120]

Farmers' markets, roadside stands, and "pick-your-own" outlets all play a role in distributing local, fresh food, and the state can do more to encourage their number and use. Purchase of local foods by institutions such as schools, universities, prisons, senior-citizen centers, day-care centers, hospitals, and military establishments is recommended. In fact, state institutions in Maine are required by law to give preferential treatment to in-state food producers.[121]

A plan to encourage supermarkets to purchase and sell regionally produced food must be a priority if local foods are to compete with imports. Education is a key here: supermarket buyers and consumers alike need to learn that purchasing local products helps the local economy while it decreases the vulnerability of our food supply.

Consumer cooperatives, restaurants, and food processors must also be encouraged to buy more local foods. The state could help establish food processing and storage facilities to supply and distribute products on a year-round basis. These centers could grade, pack, and distribute the output of small local producers and provide large buyers with the volumes and specifications they demand.[122] Such centers could also help bring in foodstuffs from outlying parts of the state to the highly populated areas. Foodbanks are another viable alternative for storing and distributing food to those who would otherwise be unable to obtain enough food.

Electronic markets, based on telephone hook-ups to a central computer, could alleviate the problem of large distances which separate producers from wholesalers and consumers in the state. Since potential buyers throughout the state could tie into the system, competitive prices would be offered to the growers. Electronic markets could also be used for advance contracting, thus insuring growers a market for their production before planting. The state could develop such a marketing system, perhaps locating the initial hook-ups at county extension offices until on-farm diffusion took place.

Tax incentives can be used to promote production and widen the marketing options in New Mexico. An example is one which would exempt from taxes the first $10,000 worth of food produced for local consumption. Tax incentives to attract food processors to the state would decrease transportation costs for processed food and develop new jobs in a clean industry.

E. Research

Research is often needed before farmers can adopt new farming methods or grow new crops. This is a role for New Mexico's land grant university to take. Continuing research needs to be undertaken in water conservation practices and developing crops which use less water. Work with water harvesting should continue to be explored as well, with experimentation on a variety of catchment area systems. Research on irrigation systems can also be expanded.

As the East Plains moves towards more dry cropland farming, the need for more drought-tolerant crops will increase. There are many crops suitable for dryland agriculture: jerusalem artichoke, amaranth, pearl millet, marginal land oilseeds such as the native buffalo gourd, and quinoa can all produce foodstuffs. Other plants such as guayule, jojoba, and gopher plant could become viable alternatives to many petroleum-based products.

Research on renewable energy resources, as well as continued state support for their adoption, is also necessary. Work is already being conducted on alcohol production and solar energy. In fact, one application of solar technology is approaching economic feasibility: photovoltaic-generated electricity may soon be used to fill stocktanks with water in locations with light summer winds.[123]

One branch of renewable energy with great possibilities is the conversion of animal, human, and other wastes to a usable gas. There is a dairy in New York that will be producing 65 to 75 percent of the energy required to run the farm by producing methane gas from manure, and a liquid fuel from corn or sunflower seed.[124] More work should be done in New Mexico with such on-farm energy alternatives.

Aquaculture research has a place in New Mexico as well. Researchers have found that over a few years, saline land can be converted to good cropland with aquaculture. The approach uses shallow ponds in fields to flush out the salts concentrated in the upper levels of the soil.[125] Also, raising fish in a system coupled with poultry or livestock production has been successful in many parts of the world.[126] Aquaculture for small-scale or home producers should also be investigated, especially in connection with greenhouses.

Effects of energy development of agriculture also need to be monitored. A New Mexico State University study found that although 1976 levels of sulfur dioxide in the Four Corners region probably did not reduce crop yields, an increase in coal-burning industries, such as coal gasification plants or more power plants could change this.[127] The break of the Church Rock tailings pond which released 96 million gallons of radioactive wastes into the West Rio Puerco also illustrates the need to watch very carefully the uranium industry's effect on our land and water.[128]

Research need not be limited to scientists and other specialists. We all can play a role in exploring new ways to build a more self-reliant and sustainable food system. Discovering the history of the food we eat is a good place to start. Graduate students, under Paul Lusk at the University of New Mexico School of Architecture and Planning, have undertaken studies in examining the urban/rural relationships in the state as well as farmland preservation. Home gardeners can continue to grow those heirloom or locally popular varieties of fruits and vegetables which grow especially well in New Mexico's climate and soils.

F. Create a Department of Food and Agriculture

New Mexico's Department of Agriculture is currently a regulatory agency. Legislation should be enacted to expand the department's involvement in the state's food system. In addition to insuring food safety and quality, the department could serve as the center for coordinating a regional food system. It could also be the prime advocate for New Mexican farmers and ranchers. Other duties the department should undertake would be to:

1. Maintain the resource base of New Mexican agriculture, including farms and farmlands.
2. Determine which imported foods could be produced locally.
3. Expand local markets.
4. Develop a clearinghouse for food-related research going on in the state (as well as in other states).
5. Promote a program to educate consumers about nutrition and how they can play a more active role in their food system.
6. Encourage through advertising campaigns the identification and promotion of New Mexico food products (Massachusetts and Pennsylvania are among the states that already developed such a program).
7. Develop a long-range food plan to regionalize our food supply.
8. Be in charge of developing an emergency state food plan.

2. Emergency State Food Plan

An emergency food plan is a form of insurance for all New Mexicans, in the event we are faced with problems beyond the state's control. An emergency state food plan for New Mexico needs to incorporate measures which will deal with contingencies such as: a complete cutoff of oil from all OPEC countries to the United States; a multi-year drought or insect infestation in our food producing areas; a near shutdown of one to four weeks of the U.S. trucking and rail system; a widespread labor dispute in New Mexico's present day food producing areas;

and an extraordinary leap in food prices so that only the wealthiest people could afford to buy food.

Some options New Mexico has for dealing with these contingencies include establishing state or regional food storage facilities, encouraging home, community, and city storage of basic foodstuffs, forming within our current Civil Defense organization state-wide communication and coordination centers for dealing with a food emergency, and the general encouragement, expressed in all these measures, of producing more of our food within New Mexico.

3. New Mexico Consumer Activities

There are numerous options available to New Mexico consumers in helping to promote a stronger and healthier food system. First of all, we must increase our awareness of how the food system operates and where our food comes from. Currently, 25 percent of all fruits and vegetables are lost through spoilage between harvest and time of purchase.[129] Nutritive losses occur as well. By purchasing more locally-grown foodstuffs, we can decrease waste, increase nutritional value, and support our local farmers and economy. Consuming more fresh foods would also save energy; twice as much energy is used in processing our food than growing it.[130] By developing a more prudent diet, consumers can lead a healthier life. In the United States most of the health problems found to be leading causes of death are diet-related diseases.[131] A healthier diet would include less fat, salt, sugar and cholesterol while including more fiber and vegetable protein.

As New Mexico consumers, we can also begin to be responsible for producing more of our own food at home. Vegetable gardens and fruit trees need to be planted. Preserving food, at home or community canneries or warehouses, would help decrease food costs. Solar drying of food is well suited to New Mexico. Also, solar grow frames, greenhouses, and sun-spaces in houses can help extend the growing season. Small-scale fish, rabbit, and chicken production can fit into many existing houses, and with a bit more land, a few hogs, sheep, goats, or cattle can be kept. It is time for the New Mexican consumers to take more responsibility for their food system. These recommendations show a place to start.

CONCLUSION

At first glance, the problems might seem insurmountable, and the goals unachievable. Our food and agriculture system is ailing, and without changes, will continue to decline until the situation becomes critical. However, there are solutions. To start working toward these solutions requires a healthy dose of optimism, and the belief that change can begin with the individual.

Implementing even a few of the suggestions mentioned above can help strengthen New Mexico's food security and economic well being, while providing consumers with more nutritious and better tasting food. These changes would also decrease our vulnerability to situations beyond our control. As farmers, consumers, and business people, church and civic groups, universities and colleges, and town, city, county and state government agencies, all New Mexicans have within their reach the means to take control of and strengthen their food and agriculture system.

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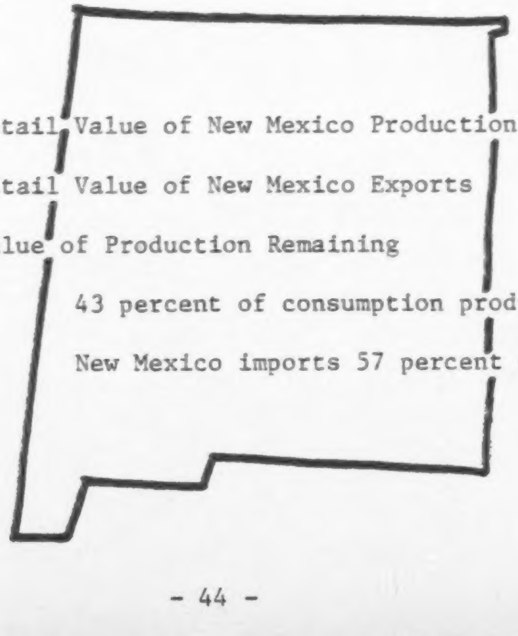
APPENDIX

New Mexico's agricultural heritage extends back four hundred years to the agrarian culture of the Pueblo Indians. Today, New Mexico produces crops of national and international importance, including pecans, peanuts, lettuce, and onions. New Mexico leads the nation in the production of chile peppers. With 1980 cash receipts from farm marketings totaling over one billion dollars, the New Mexico food and agriculture system appears to be flourishing. Despite these successes, 57 percent of the food consumed by New Mexicans is imported from other states. Each year New Mexicans spend nearly $78 million on transportation costs for food imported from as far away as Florida, Michigan, and Oregon.

Producing more of our own food would not only reduce these transportation costs, but would also create jobs for New Mexicans in food production, processing , and wholesale and retail sales. Locally produced food would provide consumers with fresher, more nutritious fruits, vegetables, and meats. Farmers and ranchers, consumers, researchers, businesses, and state and local govenments need to work together to make our food system sustainable. Farmers' markets and central food storage facilities need to be built. Residential and agricultural water use should be carefully monitered and assessed in order to conserve this precious resource. Marketing programs are needed to encourage consumers to buy locally produced fruits, vegetables, and range-fed meats. These are just a few of the steps that will lead New Mexicans to a sustainable, productive, efficient, safe food and agricultural system.



Retail Value of New Mexico Production	$ 1,097,020,900
Retail Value of New Mexico Exports	422,901,700
Value of Production Remaining	$ 674,119,200

43 percent of consumption produced in New Mexico

New Mexico imports 57 percent of its food

NEW MEXICO FOOD IMPORTS

COMMODITY	PRODUCTION	CONSUMPTION			IMPORTS		EXPORTS		Acres Required to produce 100% of NM Consumption[d]
	Retail Weight[a] (1,000 lbs.)	Retail Value[b] (1,000 lbs.) (1980 dollars)	Retail Weight[c] ($1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	
Meats									
Beef	187,077.5	435,142.3	99,450.0	231,320.7			46.8	203,821.6	616,507.1[e,+]
Veal	0	0	1,950.0	5,986.5	100.0	5,986.5		f	
Lamb & Mutton	4,771.6	14,018.9	1,690.0	4,965.2			64.6	9,053.7	710.4[g]
Pork	6,404.4	9,235.2	88,790.0	128,035.2	92.8	118,799.9			418,697.3[h,*]
Poultry									
Chickens	1.6	1.8	65,000.0	71,825.0	99.99	64,998.2			123,809.5[i,*]
Turkeys	39.9	35.9	13,650.0	12,298.7	99.7	12,262.6			42,250.0[*]
Eggs	47,971.4	22,213.5	44,980.0	20,828.3			6.23	1,384.2	92,973.3[*]
Dairy									
Fluid Milk & Cream	472,187.0[j]	435,356.5	325,000.0	299,650.0			31.2	135,706.5	198,975.3[k,+]
Butter	ND[l]		5,720.0	10,353.2					53,159.5[+]
Cheese	0[m]	0	22,880.0	51,124.9	100.0	51,124.9			73,938.6[+]
Cottage Cheese	8,240.0	7,127.3	5,850.0	5,060.0			29.0	2,067.3	2,840.5[+]
Dry Milk Products	0	0	8,840.0	14,527.9	100.0	14,527.9			9,538.8[+]
Evaporated & Condensed Milk Products	0	0	9,230.0	4,810.6	100.0	4,810.6			8,558.5[+]
Frozen Milk Products	20,101.5	35,559.6	34,190.0	60,482.1	41.0	24,922.6			36,181.3[+]
Fish									
Fresh, Frozen & Canned	NC[n]		16,120.0	30,446.8	100.0	30,446.8			697.8[o]

(continued on next page)

NEW MEXICO FOOD IMPORTS

	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
COMMODITY	Retail Weight[a] (1,000 lbs.)	Retail Value[b] ($1,000) (1980 dollars)	Retail Weight[c] (1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of NM Consumption[d]
Vegetables, Fresh									
Artichokes, Globe	NA[p]		390.0	215.2	100.0	215.2			NA
Asparagus	56.8	97.0	390.0	666.3	85.44	569.3			178.6
Beans, Snap	373.9	299.9	1,690.0	1,355.4	77.9	1,055.5			528.8
Broccoli	9.2	9.0	2,210.0	2,170.4	99.6	2,161.4			480.4
Cabbage	877.0	290.3	10,920.0	3,614.5	92.0	3,324.2			510.5
Carrots	74.7	19.2	7,930.0	2,038.0	99.1	2,018.8			636.7
Cauliflower	Insignificant		1,690.0	1,812.0	100.0	1,812.0			475.4
Celery	NC		9,490.0	3,283.5					210.0
Corn, Sweet	10,809.7	4,464.4	8,580.0	3,543.5			20.0	920.9	1,092.2
Cucumbers	697.0	312.3	5,200.0	2,329.6	86.6	2,017.3			574.4
Eggplant	84.2	44.6	650.0	345.5	87.1	300.9			38.6
Escarole	NC		780.0	627.6					61.2
Garlic	31.6	78.7	1,040.0	2,598.7	97.0	2,520.1			98.8
Green Bell Peppers	11,920.1	9,691.1	4,290.0	3,487.8			64.0	6,203.3	587.0
Lettuce	59,892.0	20,243.5	3,237.0	10,941.1			46.0	9,302.4	1,907.2
Mushrooms	NC		3,510.0	6,419.8					
Onions	106,314.0	30,086.9	13,260.0	3,752.6			88.0	26,334.3	486.4
Potatoes	51,840.0	7,827.8	64,090.0	9,677.6	19.1	1,849.8			3,708.9
Spinach	5.6	10.6	910.0	1,718.1	99.4	1,707.5			324.0
Tomatoes	7,291.7	5,366.8	14,820.0	10,907.5	50.8	5,540.8			1,660.5
Minor Vegetables (Limas, Beets, Kale, Green Peas)	NC		13,260.0	8,231.1					
Sweet Potatoes	4,737.9	2,518.7	4,420.0	2,249.6			6.7	169.0	414.2
Dry Field Peas	148.2	94.8	520.0	332.7	71.5	237.8			361.4
Dry Edible Beans	2,789.2	1,037.9	8,450.0	3,144.4	67.0	2,106.5			14,590.4
New Mexico Chili Peppers (dry wt)	46,800.0[q]	101,114.2	NC						

(continued on next page)

NEW MEXICO FOOD IMPORTS

	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
COMMODITY	Retail Weight[a] (1,000 lbs.)	Retail Value[b] ($1,000) (1980 dollars)	Retail Weight[c] (1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100 % of NM Consumption[d]
Vegetables									
Canned & Frozen									
Asparagus			468.0	931.9					260.7
Beans, Lima			1,001.0	565.4					340.6
Beans, Snap			9,360.0	3,625.4					1,346.8
Beets			1,560.0	562.2					70.3
Broccoli			1,820.0	2,066.2					484.1
Brussels Sprouts			325.0	316.3					30.9
Carrots			1,859.0	1,117.9					238.9
Cauliflower			598.0	556.0					221.3
Corn			10,049.0	5,177.5					2,254.8
Onions			884.0	477.9					36.6
Peas			6,292.0	3,170.6					1,715.5
Pickles			8,970.0	7,582.4					754.9
Potatoes, frozen			21,970.0	11,995.6					3,051.4
canned			1,690.0	1,334.9					147.6
dehydrated			2,080.0	1,677.3					820.4
chips & shoestring			5,460.0	10,920.0					1,237.6
Pumpkin and Squash			520.0	284.9					55.6
Sauerkraut			1,560.0	787.1					59.5
Spinach			650.0	327.9					39.4
Sweet Potatoes			1,300.0	693.4					141.7
Tomatoes, Whole			7,930.0	2,934.1					261.8
pulp, puree			1,040.0	460.1					71.8
catsup, paste, sauce			15,730.0	10,676.6					1,241.3
Fruits, Fresh									
Apples	11,520.0	8,156.2	20,800.0	14,726.4	44.6	6,570.2			4,489.7
Apricots	199.0	236.8	130.0	154.7			34.7	82.1	45.3
Avocados	NA		1,040.0	749.6	100.0	749.6			NA
Bananas	NA		27,040.0	9,085.4	100.0	9,085.4			NA
Cantaloupe	2,086.8	918.2	8,580.0	3,775.2	75.7	2,857.0			867.5

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NEW MEXICO FOOD IMPORTS (continued)

	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
COMMODITY	Retail Weight[a] (1,000 lbs.)	Retail Value[b] ($1,000) (1980 dollars)	Retail Weight[c] (1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to Produce 100% of NM Consumption[d]
Fruits, Fresh (Cont.)									
Cherries	101.6	90.3	780.0	693.4	86.9	603.1			825.9
Citrus	NA		36,140.0	10,408.3	100.0	10,408.3			NA
Cranberries	NA		130.0	110.5	100.0	110.5			NA
Grapes	91.6	131.6	4,680.0	6,726.8	98.0	6,595.2			6,049.7
Nectarines	Insignificant		2,080.0	2,425.6	100.0	2,425.6			493.5
Peaches	406.6	264.7	7,020.0	4,570.0	94.2	4,305.3			4,266.3
Pears	1,026.1	495.6	3,120.0	1,506.9	67.1	1,011.3			848.7
Pineapples	NA		1,820.0	798.1	100.0	798.1			NA
Plums & Prunes	787.7	918.5	1,950.0	2,274.0	59.6	1,355.5			459.6
Strawberries	NC		2,210.0	1,797.4					892.4
Watermelons	1,702.8	554.2	13,390.0	4,357.6	87.3	3,803.5			1,352.5
Fruit, Processed									
Frozen Fruit (noncitrus)	NC		3,601.0	5,035.5					
Citrus Juice (frozen)	NA		12,870.0	16,306.3	100.0	16,306.3			NA
Noncitrus Canned Fruit	NC		15,730.0	12,874.6					
Dried Fruit	NC		3,822.0	12,328.2					
Citrus (Canned)	NA		1,040.0	749.6	100.0	749.6			NA
Apple Juice	NC		6,188.0	7,526.8					1,748.5
Other Noncitrus Juices	NC		10,777.0	10,261.5					
Citrus Juice (canned)	NA		17,264.0	5,973.1	100.0	5,973.1			NA
Olives	NA		1,040.0	1,649.8	100.0	1,649.8			NA
Fats and Oils									
Lard	532.1	251.7	3,250.0	1,537.3	83.6	1,285.6			r
Margarine	NC		14,560.0	11,153.0					
Shortening	NC		23,790.0	17,557.0					
Oils	NC		29,510.0	27,439.3					

(continued on next page)

NEW MEXICO FOOD IMPORTS

COMMODITY	PRODUCTION Retail Weight[a] (1,000 lbs.)	Retail Value[b] ($1,000) (1980 dollars)	CONSUMPTION Retail Weight[c] (1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	IMPORTS % Import	Retail Value of Import ($1,000)	EXPORTS % Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of NM Consumption[d]
Nuts									
Almonds	NA		546.0	2,487.3	100.0	2,487.3			NA
Peanuts	12,427.7	21,324.3	7,930.0	13,606.8			36.2	7,717.5	5,615.2
Pecans	5,800.0	21,906.6	468.0	1,767.6			91.9	20,138.9	1,004.1
Walnuts	Insignificant		676.0	1,939.3	100.0	1,939.3			3,140.7
Grains									
Barley Products	Insignificant[s]		1,560.0	2,350.4	100.0	2,350.4			2,636.6[*]
Corn Meal, Cereal & Hominy	NC[t]		18,070.0	7,275.4					7,258.7
Corn Syrup, Starch & Sugar	NC[t]		70,720.0	57,699.2					59,819.2
Oat Products	Insignificant		4,030.0	2,614.3	100.0	2,614.3			4,838.4[*]
Rice	NA		12,090.0	10,832.6	100.0	10,832.6			
Rye Products	Insignificant		910.0	328.0	100.0	328.0			1,035.9[*]
Wheat Products	NC[t]		155,090.0	33,366.7					249,756.4[*]
Misc.									
Coffee, Cocoa, & Tea	NA		14,560.0	80,149.7					NA
Cane Molasses	0		260.0	374.8	100.0	374.8			
Honey	416.0	587.7	1,560.0	2,203.9	73.3	1,616.2			
Sugar	72,000.0[u]		108,680.0	40,863.7	100.0	40,863.7			20,033.9
TOTALS	1,041,848.7	1,097,020.9	1,729,793.0	1,558,619.2		575,516.4		422,901.7	2,100,219.5[v]

New Mexico Food Imports Chart

Notes:

a. Farm weights for New Mexico production were from:

New Mexico Agricultural Statistics 1980 (Las Cruces: New Mexico Crop and Livestock Reporting Board, 1981).

United States Census of Agriculture 1978 (Washington, D.C.: Government Printing Office, 1981).

Livestock Slaughter Annual Summary 1980 (Washington, D.C.: USDA Crop Reporting Board, 1981).

Dairy Products Annual Summary 1980 (Washington, D.C.: USDA Crop Board, 1980).

Retail weights were calculated from farm weights using the conversion factors in Conversion Factors and Weights and Measures Statistical Bulletin No. 616 (Washington, D.C.: USDA Economics, Statistics, and Cooperatives Service, 1979).

b. Prices were obtained from U.S. Department of Labor, Bureau of Labor Statistics; Safeway Supermarkets in Sante Fe and Artesia, New Mexico.

c. Consumption in New Mexico is based on U.S. per capita consumption figures as they appear in Food Consumption, Prices, and Expenditures, Statistical Bulletin No. 672 (Washington, D.C.: GPO, 1981) and The Mushroom Institute, Kennett Square, Pennsylvania.

d. Irrigated and/or dry cropland acreage based on New Mexico, Texas, or nationwide yields from: New Mexico Agricultural Statistics 1980; U.S. Census of Agriculture 1978; Agriculture Statistics 1980 (Washington D.C.: GPO, 1981); except where otherwise noted. Cropland is assumed to be irrigated unless noted with * for dryland, or + for dryland/irrigated, combination.

e. Based on figures from Agricultural Resources Consumed in Beef Production by Willima Lockeretz (Springfield, VA: National Technical Information Service, 1975).

f. Veal is a by-product of the dairy industry, so land area would be included in dairy land requirements.

g. Acreage requirements for lamb and mutton from Raising a Small Flock of Sheep (Washington, D.C.: GPO, 1977).

h. Acreage requirements based on 16 bushels of grain sorghum per hog.

i. Acreage requirements for chicken from Poultry: Feeds and Nutrition by Philip John Schnaible (Westport: AVI Publishing Co., 1979).

j. Production of fluid milk and cream was determined by subtracting whole milk equivalent used in dairy products from total milk production, and converted using a USDA conversion factor.

k. All dairy land requirements take into account replacement stock. They are based on feed estimates by Mr. Borden Ells, Dairy Specialist, New Mexico State University. No attempt has been made to take into account by-products of dairy goods.

l. ND - Not Disclosed. Butter is produced in New Mexico, but the New Mexico Crop and Livestock Reporting Service does not disclose the quantity.

m. Cheese, dry, evaporated, and condensed milk products are not commercially produced in New Mexico. (NM Crop and Livestock Reporting Service).

n. NC - Not Collected.

o. Extrapolated from yields of 100 lbs. of fish from 1/385th of an acre in an intensive recirculating fish culture unit. Steve Van Gorder, Rodale Research Center, Maxatawny, PA.

p. NA - Not Applicable.

q. Although Chile peppers are a major crop in New Mexico, production is not included in total production figures because consumption data is unavailable.

r. Lard is a by-product of hog slaughter, so land area would be included in pork land requirements.

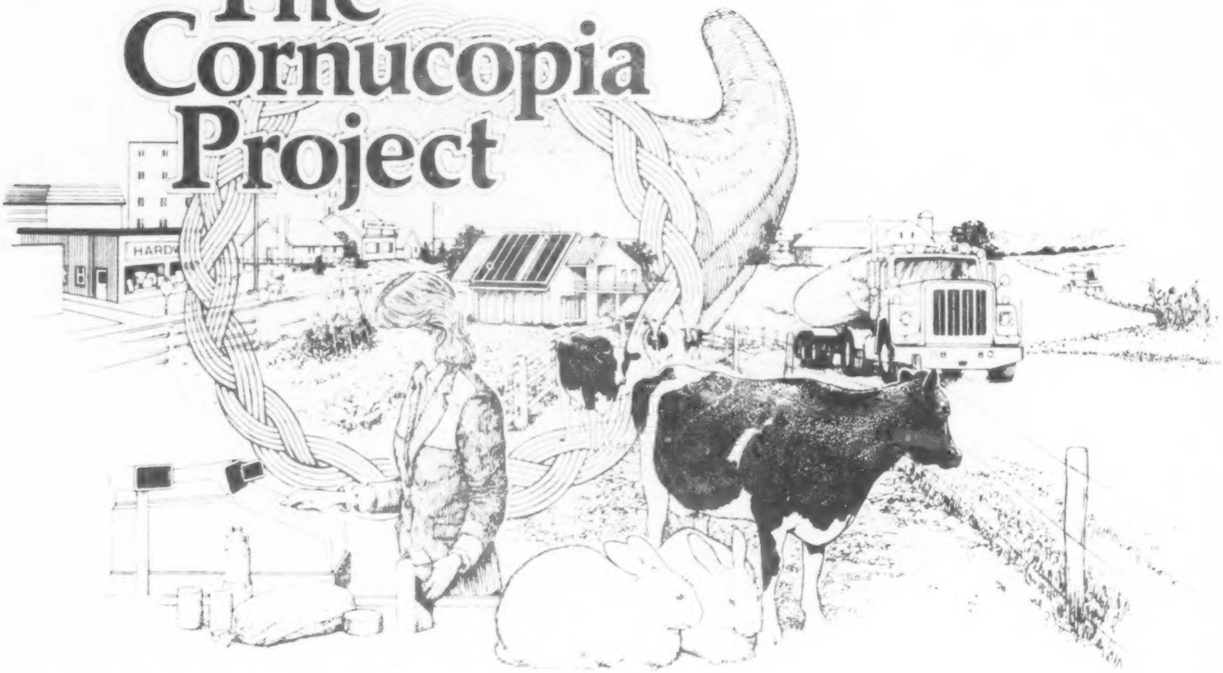
s. Barley, oats, and rye are produced in-state, but not for human consumption. (NM crop and Livestock Reporting Service).

t. Percentages of corn and wheat production used for human consumption are not collected in New Mexico.

u. In 1980 New Mexico produced 72,000,000 pounds of sugarbeets, equivalent to 8,603,138 pounds of refined sugar. All sugarbeet production was sent out of state for processing, therefore, 100 percent of consumption is imported.

v. 362,825.7 acres irrigated and 1,737,393.8 acres dry cropland.

The Cornucopia Project



TOWARD A SUSTAINABLE OHIO
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with
The Cornucopia Project of Rodale Press

1982

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Jon Shafer

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The Cornucopia Project of Rodale Press
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Emmaus, PA 18049

This project was supported in part by a grant from the
Jessie Smith Noyes Foundation to the Soil and Health Society.

Shafer, Jon. Toward a Sustainable Ohio in Food, Farmers and Land.
Cincinnati: Rural Resources, 1983.

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Rural Resources, Inc.
11 Interwood Place, Cincinnati, Ohio 45220

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ACKNOWLEDGEMENTS

Some of those who have helped me in sharing ideas, collecting data, reviewing drafts or facilitating publication are:

- Kenneth Ackers, Ohio Crop Reporting Service;
- Andrea Cesari, The Cornucopia Project;
- Betsy Foushe, former Reference Librarian, Ohio State University;
- Dr. Vern Harnapp, University of Akron;
- Dr. Dennis Henderson, Ohio State University;
- Fran Hornikel, College of Mount St. Joseph;
- Roland Kreager, Cincinnati Food Cooperative;
- Rebecca McDowell, East Central Cornucopia Alliance;
- Julie Neander, formerly Ohio Public Interest Research Group and now with The Land Institute;
- Larry Porter, Soil Conservation Service;
- Walt Reichert, Dayton area writer;
- David Rosenberg, Rural Resources;
- Mary Jo Schroeder, Schroeder, Schroeder & O'Malley Co., L.P.A.;
- John Wettstein, Ohio Farmers Union; and
- Janise Zygmont, Ohio State University.

To them and others I may have forgotten, thank you for all your help. For the limitations of this study, I bear full responsibility.

We should think of our resources
not as having been left to us by our parents
but as having been loaned to us by our children.

Kenyan Proverb

PREFACE

The family farm seems to be one of the few healthy traditions left in this country. Part of what feels right about the family farm is its accountability. The temptation to sell off a lot or two for some much needed cash is reduced by knowing that other generations have been similarly tempted and resisted. Nor does it make sense to cheat your children and their children in order to squeeze out a few more dollars at the expense of the land, the same land they'll be getting in time.

In considering changes, it's important to understand why an ancestor did it or laid it out that way before presuming the new idea is better. There is a tradition of viewing land as a work of art in the Utopian novel Islandia, by Austin Tappan Wright. Each generation carefully considers what, if any, additional touches might be made to improve the beauty, health, variety, productivity or balance of the land and what it supports, before changing this treasure that will be the inheritance of the next generation.

My father's ancestors have been farmers for, at least, eight generations. My family has worked our present farm for 102 years. Much of my reason for writing this report arises from a desire to see the land live, though I will die.

As you read this study, please think about how we can be better stewards of Ohio. If you find significant errors or omissions, I'd appreciate it if you would help improve future editions by writing me at Route 2, Box 40A, Cloverdale, Ohio 45827.

February, 1983 Jon Shafer

SUMMARY

A strong and healthy agriculture is necessary for a thriving and healthy Ohio. Evidence from Roman to modern times is used to support this position. While farming is Ohio's leading industry, major weaknesses are evident in agriculture's profitability. Rising supply prices and falling commodity prices have placed most farmers in a precarious position. A "strong" U.S. dollar and weak demand have diminished exports. The export market is fickle, given the many factors which affect it.

Large export-oriented farms are related to a variety of social ills; as studies by Goldschmidt and MacConnell document. Small and medium sized farms, in contrast, show significant social benefits on surrounding communities. Ohio has switched from exporting 37% of its grains and soybeans in 1970 to 73% exported in 1977. Livestock operations were converted to grain farms. Pastures were plowed, and many forests cut because of export pressure. As a result, three-fourths of Ohio's land now needs soil conservation treatment. 132.7 billion pounds of soil are eroding away from Ohio farmland each year. Nationally, erosion is at the highest levels ever recorded, and 25% worse than during the Dust Bowl years. Ohio is essentially exporting its soil and grain to pay for imports of oil. This trading of one natural resource for another helps our international balance of trade, but it is eroding Ohio's strength. This erosion affects not only our economic condition, but our health and security as well.

A danger equal to erosion is the loss of farmland to non-agricultural uses. At the rate of conversion of the past 35 years, Ohio will be unable to feed itself in another 35 years. It takes only about 8.9 million acres for Ohio to feed itself from its 26.2 million acre total. Ohio's farmland total was down to 16 million acres in 1978, with the potential additions from rolling forests being increasingly susceptible to erosion.

Ohio imports 57% of the food consumed in the state. While 60% of our corn and 75% of our soybeans are exported, Ohio imports [illegible]8% of its vegetables and 89% of its fruits. Our grain exports usually leave in their raw state, before any processing occurs. This means many potential jobs are lost. The fruits and vegetables we import have been processed, so most of the jobs inherent in the vegetables' retail value of $923,745,000 were located elsewhere. Ohio is in the condition of a food colony, exporting raw materials at low prices and importing processed materials at high prices.

A Buy Ohio campaign must be augmented with a Grow Ohio effort if we are to extract ourselves from our economic predicament. Ohio's food imports amount to 6 billion dollars, of which about three-fourths is money exported (one-fourth being spent on retailing). Every food dollar we spend is a vote for the food system we get. If the multiplier effect of dollars is included, then almost 12 billion dollars is being lost to Ohio's economy because of our food imports.

Ohio need not import many vegetables, some fruits, butter and cheese, as we now do. Ohio's climate and soils are suitable for many vegetables and some fruits, while only more creameries are needed to transform Ohio's surplus milk into butter and cheese. Tending to Ohio's own food needs first, then exporting the surplus makes sense also because it encourages diversity. In these changing times, diversity makes for flexibility which insures survival and healthy society.

The study concludes with a variety of recommendations to consumers, farmers, state and local government, the food industry and agricultural researchers and assisters. A variety of ways are advanced to help end soil erosion, stop the loss of farmland and increase the food security of Ohio, while benefiting its economy.

A major recommendation is that the Governor, with the assistance of the Director of Agriculture, appoint a Governor's Commission on Food, Land and Agriculture to assess this area in more depth, then propose a State Food Plan which would include appropriate goals, objectives and policies, such as:

- an adequate diet for all Ohioans;
- the preservation of prime agricultural land;
- the conservation and restoration of Ohio's soil and water resources;
- economic justice for farmers and farm workers; and
- optimizing Ohio's food production capacity to ensure an adequate supply of nutritious food at affordable prices.

Today the average morsel of food travels 1,300 miles from farm through processing and warehousing to grocery store and home. With one-third of the price of vegetables attributable to transportation costs and this portion increasing, Ohio needs to focus on its food and soil security. When it does, we will find that the economic benefits of this enlightened action will provide Ohio with more jobs. Our children and grandchildren will be well fed if we face up to our obligation to them and become the wise stewards of Ohio's resources.

The Rapid Destruction of Our Rural Culture.

Small independent farmers have moved to the cities to be replaced by energy-intensive technologies and capital. Rural lands no longer offer any opportunity in time of plenty or a social buffer in time of war and depression. Worst of all, most people view the ruination of rural America as simply an unfortunate by-product of our industrial "progress". But for others agriculture IS a culture and, as noted by Wendell Berry, ". . . a culture is a practical necessity. When a culture is destroyed it is a natural calamity." What has, in fact, been destroyed is the fundamental purpose of agriculture, viz., to create a fulfilling culture whereby productive land can be stewarded and nutured for future generations. In its place a new purpose has emerged: to produce food for profit at the expense of the land (i.e. culture). This new purpose has become the greatest calamity of all.

Richard Merrill
"The Suicide and Rebirth of
Agriculture:
Some Preliminary Thoughts on a
Bioregional Food System,"
RAIN, VII, No. 6 (April, 1981), p. 12.
Reprinted from Raise the Stakes!

INTERCONNECTIONS

A strong and healthy agriculture is necessary for a healthy civilization. This study substantiates that assertion for Ohio by looking at some of the connections between agriculture and other aspects of our society. This review begins with a few economic statistics and continues through a brief literature review that touches on medical, sociological, political and agricultural interconnections.

Net farm income dropped from 20 billion dollars in 1972 to 10 billion dollars in 1982. During the same period, total farm debt has shot up from 38 to 195 billion dollars.[1]

"So what?" many will ask, "things are tough all over." Business closings average 500 a week, the highest since 1930. Our food comes from farms and farmers. If we forget that, in our policies or in our values, we will impoverish ourselves, first in spirit then in the flesh.

The number of farms in Ohio was 220,575 in 1945 and 95,937 in 1978, with only 45,671 operators listing farming as their principal occupation. Concurrently, average farm size increased from 99 to 168 acres.[2] The total number of jobs on U.S. farms is 28% of what it was in 1910-1914. This situation is similar to conditions during the decline of the Roman empire.

> At home, the Roman elite became careless about domestic agriculture. Early Rome had many freeholding farmers, but most of their farms were consolidated into country estates worked by slaves and owned by wealthy people who lived in the city . . . Neither the slaves nor the owners dedicated themselves to the land . . . The former smallholders and free farmhands, when no longer needed on the estates, fled to the cities for employment, and feeding them became a critical problem.[3]

It is not necessary to go back to the Romans to find evidence that the state of the land and the farmer heavily influence the rest of society. One classic study, begun by Walter Goldschmidt in 1944, looks at Arvin and Dinuba, two towns of about 5,000 in the Central Valley of California. Dinuba was surrounded by moderate-sized farms, while Arvin was bounded by large farm holdings. By every measure, the community of Dinuba was better than Arvin. Dinuba had more businesses, with more trade, more self-employed, more paved streets, sidewalks, playgrounds, schools, civic organizations, churches, and newspapers.[4] Goldschmidt lost his job due to pressure from agribusinesses.

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[1] Stephen Kindel and Laura Saunders, "Please come back, W.J. Bryan", Forbes, August 30, 1982, p. 108.

[2] U.S. Bureau of the Census, 1978 Census of Agriculture, Vol. 1, Part 35 (Ohio), p. 1.

[3] Ed Edwin, Feast or Famine: Food, Farming and Farm Politics in America (New York: Charter House, 1974), p. 7.

Recently, a more extensive study of 83 Central Valley communities provided similar findings. "In the search for rural poor we found the most accurate predictor to be the proportion of Class I farms (over $100,000 farm sales/year)."[5] The proportion of absentee ownership seemed to be as important as farm size in these studies, with 160 acres being an optimal size for positive social indicators.[6]

Friends of the Land, a national organization based in Ohio, was a prominent force in soil and water conservation in the Forties and Fifties. Closer to home, the Friends of the Land viewed the health of the land as being closely linked to the health of individuals and regions.[7] The connections between land and people included the political impact of worn-out land, as well as economic, spiritual and medical implications. Sterling Worth of Friends of the Land, believed that abundance must exist in order for democracy to thrive. With such a physiocratic perspective, he tied together soil conservation and conservation of political freedoms: "Every time you see a dust cloud or a muddy stream, you are witnessing the passing of American democracy."[8]

A physician from Gallipolis, Dr. Charles E. Halzer, was a founder and a president of Friends of the Land. Dr. Halzer saw "an inescapable connection" between the soil erosion in southern Ohio and the poor health of his patients. He stated to Hugh Bennett and other new Soil Conservation Service officials that: "There's flesh and blood and vigor washing out of here in the mud of that river."[9] Today the food of most people comes from many distant places. A Department of Defense study calculated the average distance traveled by a morsel of food to be 1,300 miles between farm and plate, given all the steps in between. Today's typical diversity of sources reduces the directness connecting people and soil. The importance of a healthy soil is not diminished, it is merely obscured. Hidden from view are the conditions surrounding the growth of our food. Today most of us are blind to whatever exploitation of farmers, farm workers or land we may be supporting with our food purchases. We are typically also ignorant of the chemical context in which our food is grown, especially of the imports. Many agricultural chemicals banned in this country are still made here and shipped overseas to be sprayed on food we will later import and eat.[10] If we wish to be responsible in our purchases, we must focus them so that we or our government can reasonably guarantee the food's safety.

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[4] Wes Jackson, New Roots for Agriculture (San Francisco: Friends of the Earth, 1980), pp. 96-97. See Bibliography for the Goldschmidt studies.

[5] Dean MacCannell, Report on his work, presented to An Interreligicus Conference on Public Policy and the Structure of Agriculture, Washington, D.C., December 4, 1980.

[6] Dean MacCannell and Jerry White, Agricultural Land Ownership and Community Structure in California's Central Valley (Davis, CA: University of California, 1981), p. 11.

[7] See for instance Russell and Kate Lord, (eds.), Forever the Land (New York: Harper & Bros., 1950).

[8] Ibid., pp. 49-50.

[9] Ibid., p. 46.

Louis Bromfield was once a well-known proponent of the holistic plan for conserving soil, water and human culture. In addition to numerous novels, Bromfield's writings include collections on conservation, farming and of musings. *Malabar Farm*, the best known of these books, includes visions of health maintenance, particularly in Chapter XIV, "Out of the Earth We Are Born and To the Earth We Return," which begins:

> There is a new movement going on in medicine and in agriculture which may lead to the most important developments with regard to the health, vigor, longevity and general future of the human race. It is a movement away from patent medicines and toward preventing disease, a movement which plans to lock the stable *before* instead of after the horse is stolen. Put very simply it is a movement to create health and resistance to disease in plants, animals and humans, rather than to attempt to cure the ills and diseases after they have developed . . .[11]

In short, health maintenance and wholistic health views have come into existence with the rise of ecology and general systems theory as recognized disciplines.[12] The systems view has various names: process theology in religion; Gestalt psychology; holistic philosophy; field theory in physics and cybernetics in communications.

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[10] For full documentation of this situation see David Weir and Mark Shapiro, *Circle of Poison: Pesticides and People in a Hungry World* (San Francisco: Institute for Food and Development Policy, 1981). The IFDP is at 2588 Mission Street, San Francisco, CA 94110; 415/649-6090.

[11] Louis Bromfield, *Malabar Farm* (New York: Ballantine, 1948), p. 343. See the bibliography for other Bromfield books on conservation. Malabar Farm, near Mansfield, is now an Ohio State Park with the house furnished as it was during Bromfield's life. His library is worth the trip.

[12] Ludwig von Bertalanffy began in the 1920's to write of "organismic biology" and is generally credited with being the founder of general systems theory in 1948, with the publication of a work by that title.

Conservationists and naturalists have been notable leaders by consistently assuming a systems perspective even before it was given a name. The interconnection of agriculture with the whole can also be seen in current economic and political events.

Ohio farmers, as in many other states, responded to global grain shortage, a devalued dollar and resulting strong prices by shifting to cash grain for export operations. This shift is dramatically seen in out-of-state grain and oil seed shipments: 37% were exported in 1970; 73% were exported in 1977.[13] Five years ago a weakened U.S. dollar encouraged, even allowed, many countries to purchase U.S. grain. Today, with a stronger dollar, many countries can't afford U.S. grain, even at current low prices.

Then too, countries have realized that the U.S. may not be a dependable source of grain and oil seeds. In 1973, when the U.S.'s share of the global soybean market was 90%, President Nixon placed an embargo on soybeans. Brazil started growing soybeans. Today the U.S.'s share of the soybean market is 67%.[14] In 1974, then Secretary of Agriculture, Earl Butz said "Food is a weapon! It is one of the principal tools in our negotiating kit."[15] Secretary Block repeated that assertion several times in his early days in office, unintentionally providing more stimulus for other countries to become food self-sufficient.

The international scene intrudes into Ohio farming practices in other ways. One of the major reasons for U.S. grain exports is to balance U.S. oil imports and avoid a balance of payments deficit. With energy wastage decreasing, we are importing less oil. It is possible that grain export levels have peaked and that grain prices will seldom attain the heights of the 70's in corresponding dollars. In any case, the depressed grain prices demonstrate the danger of specialized export farming. The many foreclosures and bankruptcies of grain farmers, grain elevators and farm equipment dealers teach a somber lesson. Diversity in farming pays off in the long run. Those grain farmers with hogs, chickens or other operations are better off than those based solely on cash grain.

Once again the value of diversity is affirmed, and the dangers of specialization are shown. These lessons are also valid on other levels and will be discussed later. In summary, the general theme of this chapter could be stated as: The well-being of agriculture, and of us all, is too important to be left to the specialists.

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[13] Gary Hennen, etal., Ohio Grain Flows by Mode of Transportation and Type of Grain Firms for 1970 and 1977: A Comparison. (Wooster. OARDC, 1980), P. 4.

[14] Kindel, Forbes, 112.

[15] Time, November 11, 1974.

CONSERVING OHIO WHILE SERVING OHIOANS

> If a farmer fails because he has ruined the land, the ability of many other persons to succeed has also been lost. If too many farmers fail, the ability of society to succeed has been lost. That means the success of the farmers' business is, in part, everybody's concern.
>
> Neil Sampson
> Farmland or Wasteland:
> A Time to Choose
> (Emmaus, PA: Rodale Press, 1981).

The history of conservation in the United States includes two previous peaks of activity and interest. Gilford Pinchot, the Chief Forester under President Theodore Roosevelt, was a leader in 1908, when a White House Conference of Governors focused on new soil conservation. Hugh H. Bennett spearheaded the second wave of activity which tended to the fields. He initiated and became the first head of the Soil Conservation Service. Friends of the Land, a national conservation organization based in Ohio, provided a citizen army for soil and water conservation education from 1940 to 1954. Fifties complacency and rising agricultural productivity are the probable causes of the folding of Friends of the Land. The chart below shows the increased productivity during the Fifties in U.S. agriculture.

Figure 1. PRODUCTIVITY CHANGES IN U.S. AGRICULTURE 1870-1979[16]

Period	Average Annual Percent Change
1870-1900	+1.0%
1900-1925	-0.2%
1925-1950	+1.3%
1950-1965	+2.2%
1965-1979	+1.8%

Another breakdown of production growth rates in the 1960's and 1970's shows an overall 1.4% increase during the 1960's, including "yield" increases attributable to technological advances of 1.6%. The difference is accounted for by a -0.2% decline in planted acreage. The 1970's picture is less promising because planted acreage increases of +2.35% acccunted for most of a 3.1% production increase, with "yield technology" providing only a .75% boost.[17]

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[16] Don Paarlberg, "Enough Food? Sure If We Don't Play It Dumb" The 1981 Yearbook of Agriculture, (Washington: U.S. Department of Agriculture, 1981) p. 290.

Considering that by the late 1970's, the land in production in the U.S. (385 million acres) equaled the readily available land, large future acreage increases are unlikely.[18] And future "yield technology" increases may be offset by soil losses.

Soil loss from erosion on Ohio farmland amounts to 132,732,000,000 pounds per year, according to calculations by Dr. Vern Harnapp, a geographer at The University of Akron.[19] This soil loss would be enough to cover the Columbus metro area encircled by I-270 with three inches of topsoil.[20] The lost topsoil could alternatively cover the 54 square miles of the city of Akron with a twelve inch layer. While this erosion is less than the national average of 5.1 tons/acre/year for cultivated cropland, current national erosion levels are 25% worse than during the dust bowl years of the 1930's. [21]

During our frontier past, wasted, eroded land could be abandoned and new land cultivated. Now little new land remains. In Ohio as of 1977 there were 659,000 acres identified as having "high potential" for conversion to cropland.[22] This amounts to 5.6% of Ohio's 1977 cropland base. About a third of this high conservation potential land falls into sub-classes IIE and IVE, which are particularly susceptible to erosion. The 1980 appraisal carried out under the Soil and Water Resources Conservation Act reported that a decrease in yield of up to 34% was possible in land capability sub-classes IIE, IVE and VIE if current erosion rates continued for fifty to one hundred years.[23]

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[17] Dennis Henderson & Wallace Barr, "Economic and Political Environment for the Agrifood System in the 1980's," unpublished manuscript, Ohio State University, Department of Agricultural Economics & Rural Sociology, 1982, p. 34.

[18] Harold Breimyer, talk given to Interreligious Conference on U.S. Agricultural Policy, Washington, D.C., December 4, 1980.

[19] Soil Conservation Service, Ohio Resources Inventory (Columbus: S.C.S., 1977), p. 11. Dr. Harnapp multiplied the acreage of cropland, pastureland and forestland by 3.6, 3.6 and 2.5 tons/acre/year to arrive at the above figure.

[20] These equivalent areas are figured assuming 160 tons of soil would cover an acre with a layer one inch deep.

[21] "Our Thinning Soil", Land Resource Use and Protection, Report No. 38 (Ames, Iowa: Iowa State University, 1975), p. 1.

[22] Soil Conservation Service, p. 16.

Ohio also has 1,341,000 acres in pasture, woods and other uses which has "medium potential" for conversion to cropland.[24] However, 48% of it is in the high erosion sub-classes mentioned above. Consequently, Ohio could convert more area into cropland, but with the danger of increased erosion. Conservation measures on highly erodable soil are possible in many cases, but expensive. One has a choice: 1. increased erosion and limited production; or 2. sustainable production at an increased cost. Figure 2 summarizes the status of conservation treatment and sheet and rill erosion (non-gullied slippage).

Figure 2: OHIO LAND STATUS IN 1977[25]

	%	Acres (1,000)	Average Soil Loss (Tons/Acres)	% of Land Needing Conservation Treatment	Total Sheet & Rill Erosion Loss-year (1,000 Tons)
All Cropland	45	11,749	3.6	68%	42,199
Pastureland	10	2,614	3.6	78%	9,449
Wood/Forest Land	23	5,860	2.5	88%	14,718
Urban, Built-up Transportation	16	4,194	---	---	---
Other	6	1,454	---	50%	---
TOTAL		25,871		74%	66,366 (farmland)

The major change from 1967 to 1977 has been a loss of cropland (49% in 1967) and an increase in urban and built-up land (11% in 1967). Data for 1982 will be available in early 1983.

Ohio's topsoil is being depleted unnecessarily. It is being washed and blown away and built upon at rates that darken Ohio's future.

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[23] U.S. Department of Agriculture, *Soil, Water and Related Resources in the United States: Analysis of Resource Trends*, R.C.A., 1980 Appraisal, *Part II* (Washington: U.S.D.A., 1981), p. 34.

[24] Soil Conservation Service, p. 16.

[25] *Ibid*, pp. 3, 7, 9 and 11.

In the past chemical fertilizers have made up for some of the soil erosion with higher yielding seeds and improved cultivation practices more than compensating for the rest. However, the cost of importing potash from Canada and phosphate from Florida is rising rapidly as supplies are depleted. Three ammonification plants in Ohio convert natural gas into nitrogen fertilizers. With the increases of both natural gas prices and the cost of electrical energy needed for conversion, the price of nitrogen fertilizers has tripled in the last few years. Total fertilizer consumption in 1981 was a record 2,420,000 tons, surpassing the 1980 record use by two percent.[26]

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[26] Ohio Crop Reporting Service, Ohio Commercial Fertilizers, December 1, 1981, p. 1.

FROM AGRARIAN TO INDUSTRIAL FOOD

> The transformation from an agrarian to an industrialized food system is now nearly complete. The results are clear: technological innovations have replaced labor on farms, and specialization of work roles in the food system has increased dramatically. The farmer no longer hoes his own corn, raises his own power, prepares his own feed, or delivers his products to the general store in exchange for merchandise desired by his farm-family unit. The hoe has been replaced by chemical pesticides, the horse by a tractor, the corn grinder by a large computer-controlled feed formulator.
>
> Dennis R. Henderson and
> Wallace Barr
> Ohio's Food and Farm System in Transition
> (Wooster, Ohio: Ohio Agricultural Research and Development Center, 1982), p. 1.

Dennis Henderson and Wallace Barr, of the Ohio State University's Department of Agricultural Economics and Rural Sociology, have recently completed a study of Ohio's Food and Farm System in Transition. Anyone interested in Ohio's agriculture will find this report stimulating reading. Overall, they find that "the transformation from an agrarian to an industrialized food system is now nearly complete."[27] Within the general trends of specialization and interdependence, they identify areas where specialists have assumed roles the farmers used to fill. Equipment mechanics, market analysts, soil consultants, and chemical sellers and appliers are among these specialists.

The tripling of tractor horsepower in 30 years, of agricultural chemical use in 20 years, and of manufactured feed and fertilizers in 15 years are some of the statistical symptoms of the general trend toward specialization in U.S. agriculture.[28] Employment has moved from the farm to specialized non-farm jobs, such as fertilizer distributors and petro-chemical manufacturers, in other parts of today's food system. A number of these former farmers in non-farm food jobs live in cities, along with 80% of Ohio's population. And increasing numbers of farmland owners live off the farm, as farm mergers and share-cropping increase.

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[27] Dennis R. Henderson and Wallace Barr, Ohio's Food and Farm System in Transition. Ohio State University, Department of Agricultural Economics & Rural Sociology. Research Circular No. 273 (Wooster, Ohio: Ohio Agricultural Research and Development Center, 1982), p. 1.

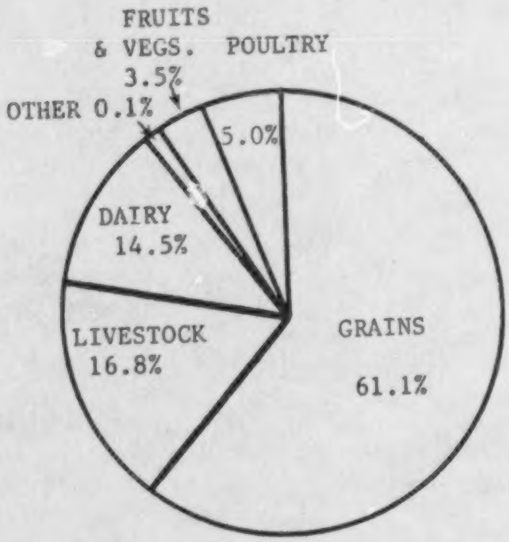
[28] Ibid., p. 2.

There is a negative correlation between absentee land ownership and conservation practices, as the former has increased while the latter has decreased. The MacCannell study mentioned earlier linked absentee ownership with other negative factors. Farm mergers and absentee ownership are signs of the increasing size of the average farm, which has nearly doubled since World War II. Larger farms are also symptomatic of cash grain farms, that is, raising grain to sell, rather than for on-farm feeding.

The type of farming in Ohio is of major importance to those interested in food diversity and sufficiency. Henderson and Barr find that already in 1977 grains accounted for 61% of farming income in Ohio, as Figure 3 shows.

> Farming in Ohio is rapidly becoming specialized in cash grain production. Contributing to this development has been the price advantage along with improved yields of corn, soybeans and wheat. Demand, particularly for grain exports, has grown sharply. The same cannot be said for many of the other crops, including tomatoes, potatoes and sugar beets. Expectations are that the three major grains will continue to increase their share of total crop land average in Ohio.[29]

Figure 3: VALUE ADDED TO FOOD IN OHIO IN 1977 BY FARMING ($2.049 Billion)[30]



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[29] Ibid., p. 17.

[30] Ibid., p. 9.

Figure 3 shows the breakdown of farm income in Ohio by major categories. The value added total ($2.049 Billion) is the amount of the cost in Ohio's food consumption that was added by the farming operation itself. Figure 3 shows that 61.1% of the value added to Ohio food consumption at the farm derive from grain production in Ohio.

Figure 3 also serves to illustrate the difference between the value added economic approach, used in the Henderson-Barr study, and the food systems approach used in this report. In value added economics, dollars are watched and assigned to different levels of operation. In the food systems approach, the food itself is traced. In the next chapter, food consumption is compared with food production for the state. Net import or export figures are then calculated for each of a hundred or so food commodities. Figure 3 highlights the difference by looking at grain as a case in point.

The value-added approach of Figure 3 combines production and consumption, and the 61% figure applies to the production value of grain in Ohio's farm system. However, in terms of direct human consumption, Ohio grain value is only 33% of the value of Ohio's food production.[31] Most of the corn and beans grown are eaten by livestock, and we eat them or their products. Thus direct grain consumption per capita is less than 200 pounds per year, while counting the grain fed to livestock results in about 2,000 pounds per year in human consumption. In the Ohio food production, this study separates out the grain fed to livestock and does not include it in the food consumed category. Food consumption data indicates that human grain consumption is only 6.2% of home food expenditures.[32] By using actual consumption data, this study arrives at distinctly different figures than the Henderson-Barr research.

A recent study of Ohio grain flows reveals that 60% of Ohio's corn is exported, 75% of our soybeans and 40% of the wheat. Since so much of Ohio's acreage is devoted to export production, Ohio must import many food stuffs which we could grow and process here. The grain exports are generally shipped out in their original form, so no processing jobs are created. Meanwhile Ohio's food imports have been processed elsewhere, draining Ohio dollars to pay for jobs elsewhere. However, if one assumes that all farm production in the state is part of the food consumed in Ohio, then Ohio appears to be almost self-sufficient in food. For example, the flow chart below indicates that 85% of the value in the food production used in the state is added within the state. The next chapter provides a different perspective.

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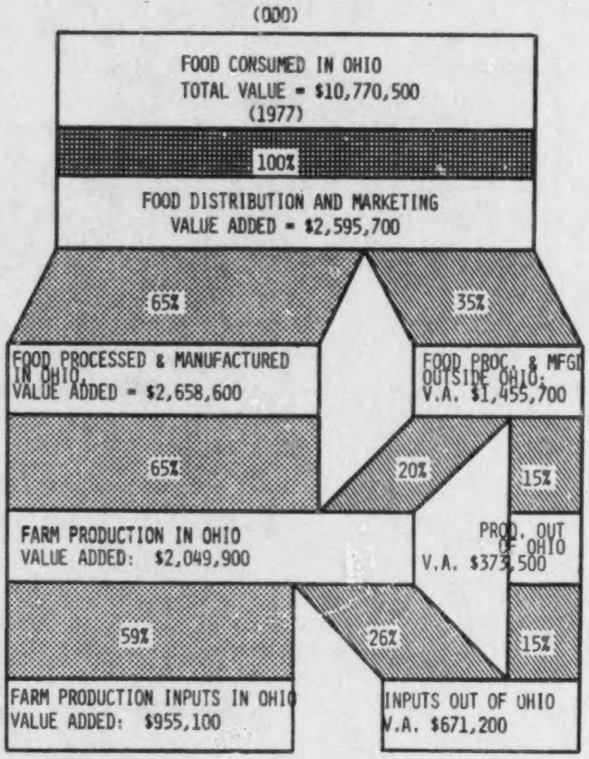
[31] The Ohio Food Production and Consumption chart, Appendix I, shows retail value of production for many commodities. Adding up the value of the grain eaten by people, a total of $2,328.525 million dollars is reached, while the total retail value of Ohio food production is $7,023.677 million dollars. Dividing the first by the second results in the .33 figure.

[32] U.S. Department of Agriculture, Food Consumption, Prices and Expenditures, 1960-80 (Washington: Government Printing Office, 1981), p. 104. From Statistical Bulletin #672, Table 91, "Total Farm Value By commodity group for domestic farm food products bought by civilians." 6.2% is the total of the "Grain Mill" and "Bakery" categories.

Figure 4: VALUE ADDED TO FOOD CONSUMED IN OHIO BY COMPONENT INDUSTRIES, 1977[34]


(000)
FOOD CONSUMED IN OHIO
TOTAL VALUE = $10,770,500
(1977)
100%
FOOD DISTRIBUTION AND MARKETING
VALUE ADDED = $2,595,700
65%
35%
FOOD PROCESSED & MANUFACTURED IN OHIO,
VALUE ADDED = $2,658,600
FOOD PROC. & MFG
OUTSIDE OHIO:
V.A. $1,455,700
65%
20%
15%
FARM PRODUCTION IN OHIO
VALUE ADDED: $2,049,900
PROD. OUT OF OHIO
V.A. $373,500
59%
26%
15%
FARM PRODUCTION INPUTS IN OHIO
VALUE ADDED: $955,100
INPUTS OUT OF OHIO
V.A. $671,200

Ohio's Food and Farm System in Transition concludes by noting the rapid increase in farm level concentration. What this means is that a lot of farmers are going under, and the survivors grow larger by absorbing their neighboring farms. Henderson and Barr see growing "opportunities for alienation and . . . industrial strife" in the future of Ohio's food and farm system.[35]

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[33] Gary Hennen, et al., Ohio Grain Flow by Mode of Transportation and Type of Grain Farms for 1970 and 1977: A Comparison (Wooster, Ohio: O.A.R.D.C., 1980), p. 4.

[34] Henderson and Barr, p. 9.

[35] Ibid., p. 24.

HOW MUCH OF OHIO'S FOOD IS OHIO RAISED?

> In no other field of activity can the whole principle of the Reverence for Life, which may indeed constitute the very basis of the preservation of our civilization, be so thoroughly, easily and profoundly understood and exercised as in the field of agriculture for, as I have pointed out many times in this book, it is the only profession in which man deals constantly with all the laws of the universe and life. A productive agriculture of high quality is the very foundation of our health, our vigor, even of our intelligence, for intelligence expands, grows and functions best in a healthy and vigorous body.
>
> Louis Bromfield
> From My Experience
> (New York: Harper and Brothers, 1955), pp. 348-349.

The Ohio Food Production and Consumption (Appendix I) chart at the end of this report shows that 43% of Ohio's food is raised in Ohio. These are conservative figures since retail data on many imported fruits were not complete. The total retail value for consumption listed on the chart reflects about 90% of the actual total for retail food purchases in Ohio. Much of the remaining 10% would fall into the "junk food" category, and would be difficult to trace back to its real food basis.

Basically, Ohio imports meat, fruits and vegetables and exports most dairy products. Grains show a marked division with the major exports being corn, soybeans and soft wheat. But Ohio imports all of the wheat used in bread and buns, as well as some barley, oats, rice and rye.

A look at the grain section will reveal that while enough barley, oats and rye are grown in Ohio for the state's people, only 2.4%, 8% and 14.7% respectively, of these grains end up as people food.[36] The great majority of all grain, except wheat, goes into livestock feed, where it is converted into human food.

Transportation Considerations

Ohio has four soybean processing plants, thirteen flour millers and, in Toledo, major export grain terminals. In 1970, 75% of all grain and oilseed exports in the country left through Toledo and the St. Lawrence Seaway.[37]

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[36] These percentages are from the National Feed and Grain Association and are based on national grain disappearance. 9.75% of corn and 2% of soybeans are consumed by humans, according to the Corn Refiners Association and The American Soybean Association.

[37] Hennen, p. 34.

This outlet provides a transportation rate advantage, increasing corn and bean prices paid to farmers by 10-15%. Because of these and other facilities, over a hundred million bushels of grain from other states pass through Ohio.

Inefficiency marks the global transportation of many food items. Ohio has a marked transportation advantage in vegetable marketing over California.

> "Within a 200-mile radius of Columbus there are 26 million people. Within a 500-mile radius lives 52% of the U.S. population and about 40% of the Canadian population."[38]

Ohio Vegetables

Ohio production of vegetables and potatoes has increased 16.2% from 1970 to 1982. As of 1980, the state was self-sufficient in only three vegetable areas: cabbage for sauerkraut; cucumbers for pickles, and escarole/endive. Even though Ohio was second in processed tomatoes, we still imported 28% of that item. A partial reason for this apparent incongruity is the vast distance between the second and first ranked states, which is California, of course, with 11,082,000,000 pounds. Concentration of supply and a growing importation of tomatoes from Mexico seem to be the causes for Ohio's importing tomatoes.

Home gardens production does not appear in this food chart, since the produce is not commercially available. According to a Gallup Poll survey, 54% of Midwestern households had gardens in 1980, with the average yield being 588 pounds of food, valued at 460 dollars per garden.[39] If Ohio's 3,338,000 households garden in comparable numbers, then 1,962,744,000 pounds of food are produced worth $1,535,480,000. Most of this food would be vegetables, with some fruits.

According to William Brooks, O.S.U. Extension Horticulturalist:

> "Three-fourths of Ohio's land is suitable for vegetable growing. And there is an increasing interest on the part of supermarket chains of locally grown produce. We have a nice early vegetable area in southeast Ohio, which has been increasing in production by 15-20% in the last couple of years.
>
> We're in a good, central location; we have the right kind of soil, the climate, and the resources. The potential for increased production, keyed to aggressive marketing, is a very positive situation."[40]

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[38] Irene Clepper, "Vegetable Market Potential Increasing", The Packer June 26, 1982, quoting Gene Wittmeyer, OSU Extension Horticulturalist.

[39] Gardens for All, National Gardening Survey, 1980-1981, conducted by The Gallup Organization for The National Association for Gardening, Burlington, Vermont.

[40] Clepper, op cit.

With encouragement from the government of Ohio, this state could grow most of the vegetables it consumes, as well as many of the non-citrus fruits. In 1980, Ohio's vegetable imports had a retail value of $923,745,000, while our exported vegetables were worth only $74,863,000. We are even worse off in fruit importing at least 89% of all fruits, compared to vegetable importation of 68%.

Economic Impacts

Ohio has declined 17% in meat production from 1970 to 1980, while the South and West have increased their share.[41] According to Dean Baldwin and Don Larson:

> Important factors which contributed to this change of location in livestock production were innovations such as boxed beef, improvements in transportation facilities and improvements in cooling and freezer systems which permitted shippers to move livestock products relatively long distances from the production centers to the consumption centers. In addition to these innovations, the meat packing industry which had been centered in the Midwest, closed obsolete plants and relocated new facilities in the South and West.[42]

It is likely that rising energy/transportation costs will change the above "improvement" into liabilities. Ohio provides exports in all dairy products except butter and most cheeses. We have remained largely self-sufficient in dairy because the transportation cost of $1.50 per hundred weight of milk from Wisconsin to Ohio helps provide a sufficient market advantage to maintain Ohio's dairies.[43]

Overall, the retail value of the food Ohio imports is $6,027,004,000. Since about a quarter of the typical food dollar goes to distribution and marketing, not all six billion is lost to Ohio's economy. However, if one considers that for every dollar remaining in the state, $2.60 of local business is generated, almost twelve billion dollars is being lost to Ohio's economy through the current food system.[44] $1,103 per Ohioan is what stands to be gained for Ohio's economy if Ohio were to become self-sufficient in food.

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[41] Ohio's dairy industry remained constant through the O.A.R.D.C., Ohio Agricultural Statistics, 1970-1975, p. 48; O.A.R.D.C., Ohio Agricultural Statistics, 1976-1979, p. 50; and O.C.R.S., Ohio Agricultural Statistics, 1980.

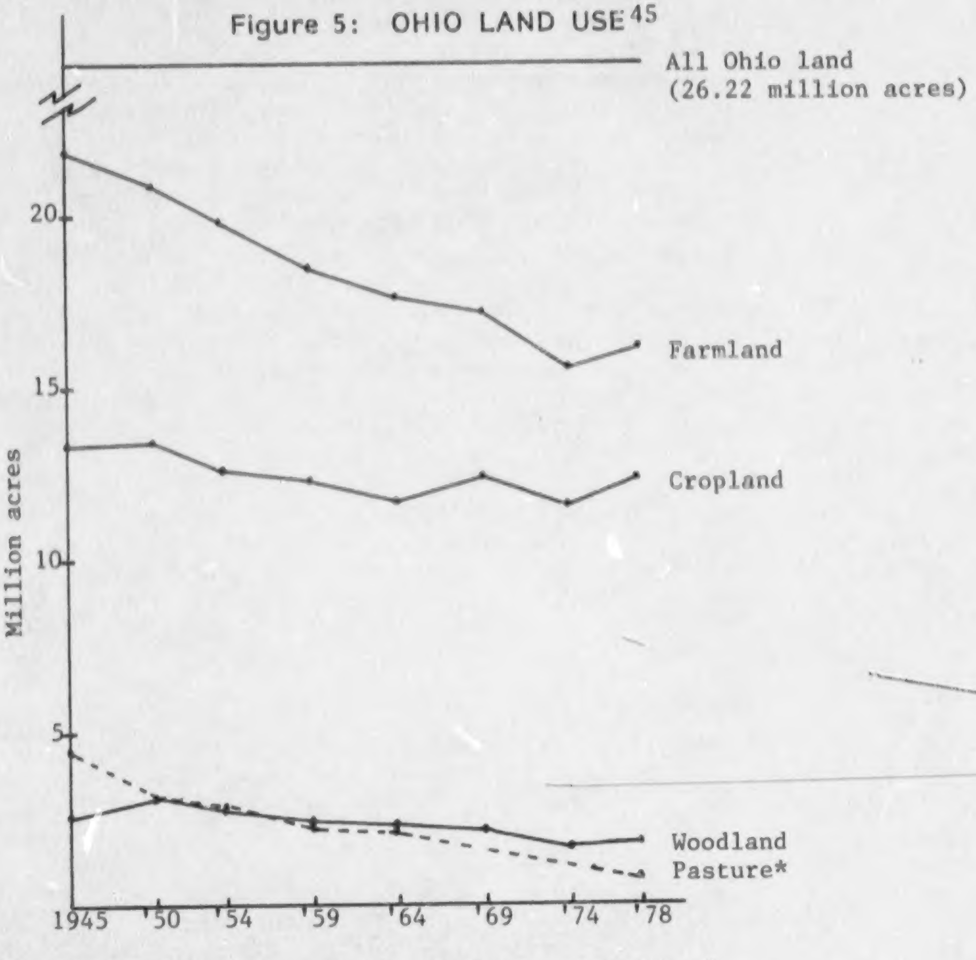
[42] In Projected Production of Grain and Oilseeds and Consumption by Livestock in Ohio for 1985, 1990 and 2000, (Wooster, Ohio: O.A.R.D.C., 1981) AERS Research Report #1, p. 25.

[43] Conversation with Floyd Groff, Jr., Continental, Ohio, dairyman, on December 16, 1982.

Ohio's Land and Its Use

Natural resources need to be considered as well when thinking about Ohio being more self-reliant in food. As the Food Chart shows, adding up the acreage required to grow all of the climatically possible food yields a total of 8,942,243 needed acres. Ohio includes 26.22 million acres, of which the total cropland is now (1983) 12.06 million acres. Figure 5 below shows Ohio land use from 1945 to 1978.

Figure 5: OHIO LAND USE[45]



* Other than that used for cropland and woodland

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[44] Conversations with Dennis Henderson and George Morse, Ohio State University, Department of Agricultural Economics and Rural Sociology. $6,027,004,000 × 76% = $4,580,523,040 × $2.60 = $11,909,359,900.

[45] U.S. Bureau of the Census, 1978 Census of Agriculture (Washington: Government Printing Office, 1981), p. 1.

Notice the sharp decline in total farmland and the gradual decline in total cropland. Over the 33 years from 1945 to 1978, the average cropland loss was 32,600 acres per year. Should this post World War II trend continue, in 96 years Ohio's land reserve of 3.12 million acres will be gone. Beyond that point, Ohio will have lost the capacity to feed itself, let alone export food.

Unfortunately, if current patterns continue, Ohio has much less than 96 years to save an adequate land base. In 35 years Ohio could lose the capacity to feed itself, let alone export food, if current trends of farmland loss continue. This is because the sharply dropping farmland acreage will, at the average rate of the past 40 years, force cropland to drop below our needed acreage of 8.94 million acres by 2019. Assuming a continuing loss every five years of 884,385 acres, Ohio could be unable to feed its current population, because of lost land. It is calculations such as these that led the Midwest Governors Conference to discuss a Soil Depletion Tax recently. Land and soil are finite natural resources which have been slowly created over millions of years. For Ohio to lose almost nine hundred thousand farmland acres every five years for the past thirty-five years is shortsighted to the point of inexcusable.

Already there are thousands of Ohioans suffering from hunger and malnutrition because of their low income, lost jobs, and escalating food prices (at a time of falling crop prices). As prime agricultural land becomes more scarce and valuable, beginning farmers will have no hope of capitalizing a start in agriculture, causing even more rapid concentration of ownership. The quality of life would decline for all in this case, as the Goldschmidt and MacCannell studies show. That's what could happen, unless we in Ohio become active and stop these dangerous trends. The recommendations that follow are offered as a starting point in this essential work.

RECOMMENDATIONS

The overall goal of this effort is for Ohio to be secure in its food supply. Food security means:

- an adequate diet for all in Ohio;
- securing economic justice for farmers and farm workers;
- conserving soil and water resources;
- preserving prime agricultural land;
- using renewable, permanent energy resources whenever possible throughout the food and farm system;
- strengthening the family farm system and farming communities;
- developing a regional food system that ensures the availability of nutritious food at affordable prices; and
- coordinating the economic system so as to foster sound agricultural development.

Toward these ends a series of more specific recommendations follow addressed to consumers, farmers, state and local governments, industry and research groups.

I. Recommendations to All.

1. Be conscious of what you eat and drink by reading labels. Learning about proper nutrition, exercise and rest, then applying this knowledge is the most important thing you can do to assure good health.

2. Eat locally or regionally produced food whenever possible. Each dollar you spend on food is a vote indicating the kind of food system you want. In the event of a real crunch, you'll want strong food sources close by. Frequent roadside stands, pick your own places and farmers markets. Ask for local produce in grocery stores.

3. Buy extra fresh food at the season's peak, when the price is lowest. Process and store it for off season use. For ideas on seasonal recipes month by month, you may want to buy a mini-Mich seasonal cookbook for $1.00 from the Land, Food and Justice Committee, Interfaith Council for Peace/CALC, 604 East Huron, Ann Arbor, MI 48104.

4. Plant and tend a garden if you're able. If you need land, ask around. It's likely you'll be able to find some available for the caring or surplus sharing. A community garden group may be able to help transform vacant lots into city gardens.

5. Extend your growing season with cold frames (also called solar grow frames) and/or container gardening.

6. Join and work with a local food cooperative or organization. If you don't know of the closest co-op, contact The Federation of Ohio River Cooperatives, 320 Outerbelt Drive, Suite E, Columbus, Ohio 43213; (614) 861-2446. Many food and farm groups exist, so look

around for one suited to your taste. If you don't know where to start, see the list of organizations at the end of this report. There is a Food Task Force working to get these recommendations implemented. Please contact us at 65 South Fourth Street, Suite 400, Columbus, Ohio 43215 or through the author.

7. Investigate the need to protect prime farmland in your area. Lobby the appropriate authorities to save the best land for farming. Start a land trust, if necessary, to purchase selective farmland that is threatened by non-agricultural use. A land trust is a non-profit corporation which can own real property or interest in real property. Check with The American Farmland Trust for details.

II. Recommendations to Farmers.

1. Work together with other farmers to save family farming. If industrialization of agriculture proceeds much further, only large corporations will have the initial capital and be able to risk farming.

2. Conserve your soil. It has taken millions of years to make it, don't let it wash away in a few decades. You know your land. Talk over your erosion problems with the Soil Conservation Service, agree on regenerative steps and get partial funding from the Agriculture Stabilization Conservation Service office in your county.
    a. Take severely eroding land out of production.
    b. Graze livestock on marginal, hilly land.

3. Reduce your energy use in fuel, fertilizer and petro-chemicals. Since petroleum prices will be rising again, use this temporary respite to figure out renewable energy alternatives. Maximize natural fertilization possibilities, such as manure, plowing down green manure crops, earthworms, appropriate rotation with legumes, etc. Utilize no and minimum tillage practices. Use a good soil testing service to prevent over-fertilization and wasted money.

4. Work with or start a co-op to generate methane, refine sunflower oil into diesel fuel, bulk buy and sell. There is strength in numbers.

5. Save good farmland for farming. Check out state legislation for preserving prime farmland. Work to strengthen and pass good legislation.

6. Grow food for people, instead of for export. Examine the Food Chart to see what foods are in short supply in Ohio and whose desired climate and soil are the same as yours.

7. Sell directly or more directly, and keep the middle person's share. We farmers need to get a larger share of the food dollar if we're to survive. Consider starting a producer or processor co-op to help promote your product in local institutions and food stores. Small scale processing of meats, pickles, cheese and produce can be an easy way to increase your income.

8. Use a variety of seed varieties, minimizing the chance that a disease can take the whole crop. And before selecting a variety, check local direct buyers to determine their preferences.

9. Use integrated pest management (IPM) and other natural methods of pest control, thereby reducing costs and energy use.

III. Recommendations to Local Government

1. Authorize a department and staff to promote local food production and processing. This will stimulate your economy and create jobs.
    a. Encourage all agencies to buy local food.
    b. Stimulate food self-reliance projects at all parts of the food system. This could include greenhouses, community canning and storage centers and other small enterprises.
    c. Promote contract growing with local growers, by public and private agencies and individuals.
    d. Use previously wasted heat for greenhouses: co-generation.
    e. Revise planning requirements to encourage gardening, especially for new multiple-unit housing projects.
    f. Plant trees for conservation, shade, cooling, windbreaks, food and fuel.
    g. Ensure solar access rights are guaranteed by law.

2. Encourage local markets.
    a. Set up a farmers' market, if needed, choose a good location and promote it.
    b. Facilitate mobile farmers markets visitation of neighborhood centers, housing projects, etc.
    c. Assist in the establishment of food co-ops and neighborhood preservation centers.

3. Have the planning commission give high priority to protecting prime farmland in your zoning and land use regulations. "Leap frog" development costs more and causes everyone problems. Consider creating agricultural open-space preserves.

4. Promote gardening by assigning staff to locate and make available unused public and private land for community gardens. Promote technical assistance in cooperation with appropriate federal and state agencies.

5. Lobby at the state and federal levels for needed farm and food legislation. Food is everyone's special interest.

6. Use organic leftovers like leaves and sewage for compost. Keep harmful chemicals out of the sewers, and after primary treatment the sludge can be sold or pumped into irrigation systems. Establish or help start recycling facilities if none exist.

7. Determine if a "food hot line" is needed for those in need of emergency food. Establish a "food bank", if needed.

8. Engage in educational programing on the food system and help provide technical assistance in specific areas of need.

9. Start joint planning agreements with neighboring governments to protect farmland and discourage suburban spread.

10. Assist in soil and water conservation efforts with appropriate monitoring, planning, and regulation.

11. Help planners and developers select the appropriate locations for factories, homes, shopping centers, schools and other buildings. The Land Evaluation and Site Assessment program being set up by the Soil Conservation Service could help.

IV. Recommendations to State Government.

1. The Governor, with the assistance of the Director of Agriculture, should appoint a Commission on Food and Agriculture and charge it with researching and drafting a State Food Plan. Such a plan would include:
   a. Goals for the state in food and farm matters;
   Suitable goals might include:
      1. An adequate diet for all Ohioans:
      2. The preservation of prime agricultural land;
      3. The conservation and restoration of soil and water resources;
      4. Economic justice for farmers and farm workers;
      5. Optimizing Ohio's food production capacity to ensure an adequate supply of nutritious food at affordable prices;
      6. The preservation of the family farm system;
      7. Maximizing Ohio's use of solar and other renewable, permanent energy resources; and
      8. Stimulation of Ohio's economy.

   b. Reviewing the economic plight of Ohio's farmers to determine what the state can do to help;
   c. An assessment of the state of Ohio's soils, farmland, waters, forests, and other agriculturally related natural resources with suggestions for steps to maintain or restore their health.

2. Promote Ohio agricultural production by:
   a. Designating the Director of Agriculture to assume the leadership in devising ways for Ohio to diversify its agricultural production;
   b. Offering incentives for farmers to diversify their farm production;
   c. Mandating that the Cooperative Extension Service prodice appropriate technical assistance;
   d. Investigating grocery-chain buying patterns to determine the causes for discrimination against local produce, and take appropriate legal action;

e. Assigning appropriate bodies to research the extent to which Ohio could be food self-sufficient and the economic results of such a situation.
f. Establishing state experimentation and demonstration plots to determine the most suitable varieties of imported species for Ohio's climate and soils;
g. Encouraging homesteading and discouraging hobby farm tax shelters for the wealthy by appropriate revisions of real estate taxation;
h. Designating state tax credits for farm and home production, preserving, and storing of food;
i. Investigating and promoting the creation of more food processing facilities and jobs in the state; and
j. Increasing the profitability of farming.

3. Preserve prime farmland by:
   a. Mapping all land to identify those areas in need of protection;
   b. Devising appropriate land use requirements to assist farmers in keeping farm land in production and out of the hands of speculators;
   c. Investigating all state-owned farmland to assure its adequate maintenance; and
   d. Monitoring land transactions more carefully to be aware of any corporate or foreign land purchases.

4. Conserve and restore Ohio's topsoil by:
   a. Assessing the workability of existing laws on soil erosion and correcting those in need;
   b. Linking economic programs for farmers to good stewardship practices;
   c. Taxing soil losses in excess of replacement levels;
   d. Rewarding soil regeneration through use of tax credits, enhancement of existing conservation programs, and encouragement of healthy agricultural practices; and
   e. Educating all Ohioans to the need for, and their role in, conserving Ohio's topsoil.

5. Increase local marketing programs by:
   a. Promoting direct marketing through farmers markets, roadside stands, and pick-your-own operations;
   b. Establishing a computer service to get and keep Ohio producers in touch with buyers around the state;
   c. Promoting both a Grow Ohio and a Buy Ohio campaign (on which a good start has been made). Great strides can be made in growing more fruits and vegetables and processing more butter and cheese; and
   d. Give preference to in-state producers as suppliers for state institutions.

6. Strengthen agricultural energy conservation programs and so stimulate the economy by:
   a. Giving high priority to ag energy conservation in state research;

  - b. Giving priority to ag energy conservation work through the Cooperative Extension Service and other technical assistance programs;
  - c. Developing state demonstration projects and other educational programs to help farmers, processors and everyone convert from temporary energy sources to permanent ones; and
  - d. Providing low-interest loans and tax credits to promote energy conservation.

7. Educate state personnel and the general public about the importance of having a strong, durable agricultural system by:
  - a. Directing appropriate state programs to include agriculture and food education along with related educational programs;
  - b. Stressing the need for regional food security by research and demonstration projects;
  - c. Planning for food crises that might arise from strikes, fuel, shortage, pests, droughts, floods, and other natural diseases; and
  - d. Promoting nutrition, exercise (through gardening) and rest as natural, effective ways to maintain good health and keep down medical expenses.

V. Recommendations to the Food Industry.

1. Regionalize food purchasing, processing and distribution. Anticipate the increases in transportation costs yet to come.

2. Grocers should optimize their purchases of locally grown food by promoting it, especially in peak season, as being fresher, cheaper and more nutritious.

3. Minimize energy costs by less processing, simpler or bulk packaging, and reducing or using the most efficient transportation.

4. Develop good public relations material emphasizing use of fresh, nutritious foods from Ohio.

VI. Recommendations to Agricultural Research and Assistance Agencies.

1. Plan for optimal food self-sufficiency for Ohio and work out the steps involved in getting there.

2. Determine how, where and which varieties of plants and animals can best be grown or raised in Ohio. Especially promote the increased production of food commodities which are in short supply in Ohio.

3. Continue and expand research and application of energy-saving on renewable energy-using techniques.

4. Orient all work to the sustain-yield levels suitable to the carrying capacity of Ohio.

5. Develop new varieties of plants and animals better suited to Ohio's climate and soils.

6. Investigate and promote rural health in terms of reducing or eliminating cancer-causing and mutation-causing agricultural chemicals.

7. Intensify efforts to reduce all soil erosion to or below levels matched by the topsoil making capacity of the land.

8. Promote tree farming and reforestation of severely eroded, hilly areas.

9. Guarantee that all strip-mined land be restored to acceptable pre-mining conditions.

10. Orient your work more to the small and medium size family farm operations. This applies to cropping patterns, marketing, appropriate scale equipment.

11. Work out ways of using all suitable organic products in the state so as to increase soil fertility. Waste recycling and composting assistance is especially needed.

12. Promote use of effective natural methods of weed and insect control.

13. Develop more energy efficient methods throughout the food system.

14. Promote and assist in the optimization of food production close to cities, in order to reduce transportation costs and increase food security.

OVERSIZE FOLDOUT(S) FOUND HERE IN THE PRINTED EDITION OF THIS VOLUME ARE FOUND FOLLOWING THE LAST PAGE OF TEXT IN THIS MICROFICHE EDITION.

SEE FOLDOUT NUMBER 1-2

APPENDIX II: BIBLIOGRAPHY

If the size of the full bibliography is overwhelming and you don't know where to start, here are some recommendations.

Berry, Wendell. *The Unsettling of America: Culture and Agriculture.* San Francisco: Sierra Club Books, 1977. 228 pp.

If you read only one book about agriculture, this is the one to read. Today's best essayist takes a long, good look at what is happening and what it means.

Conference on Alternative State and Local Policies. *New Directions in Farm, Land and Food Policies: A Time for State and Local Action.* Joe Belden, et al., editors. 2nd Edition. Washington: Conference on Alternative State and Local Policies, 1980. 320 pp. $9.95.

An excellent resource with sections on: Strengthening the Family Farm; Protecting Farm Land; Conserving; Supporting Low-Income Farmers; Building Urban and Consumer Food Policies; Implementing State and Local Food Plans; and Resources and Contacts.
Contact: The Agriculture Project, Conference on Alternative State and Local Policies, 2000 Florida Avenue, N.W., Washington, D.C. 20009; (202) 387-6030.

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A romantic novel about four generations on the land, their idealism, integrity and all around lust.

Bromfield, Louis. From My Experience: The Pleasures and Miseries of Life on a Farm. New York: Harper & Brothers, 1955.

"If at times in this book the tone of writing appears to be unduly controversial, I attribute this to long contact with many of the closed minds and the unimaginative mentalities with which agriculture, like any other science, is afflicted. Some of the chapters require hard concentration on the technique of farming, some are concerned with philosophical reflection and others may seem light to the point of triviality."

Bromfield, Louis. Out of the Earth. New York: Harper & Brothers, 1950. 305 pp.

"This book ... is ... not written for the practical farmer alone but for those hundreds of city and suburban dwellers ... who have a lively and even recreational interest in reading about everything which concerns agriculture, wildlife, nutrition and in general that vast and complex world with which good agriculture is concerned." (p. ix.)

Bromfield, Louis. Malabar Farm. New York: Ballantine, 1948.

Bromfield, Louis. Pleasant Valley. New York: Harper & Brothers, 1945. 302 pp.

"This book is a personal testament written out of a lifetime by a man who believes that agriculture is the keystone of our economic structure and that the wealth, welfare, prosperity and even the future freedom of this nation are based upon the soil." (p. vii.)

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APPENDIX III
LISTING OF OHIO FOOD ORGANIZATIONS

Adams County Dairy Service
Cooperative Association
c/o Extension Office
Court House
West Union, Ohio 45693

Agri-Urban, Inc.
222 South Sycamore Street
P. O. Box 117
Lebanon, Ohio 45036

All Ohio Chapter, Soil Conservation
Society of America
124 Parkview Avenue
Circleville, Ohio 43133
Mr. Paul B. Hoskins, President
(614) 474-6516

American Association of Agricultural
College Editors (AAACE)
c/o James Chapman, Coordinator
2120 Fyffe Road
Columbus, Ohio 43210
(614) 422-2011

American Association of University
Women
1050 East Cooke Road
Columbus, Ohio 43224
Ms. Marie Pheiffer

American Association of Veterinary
Ophthalmologists
P. O. Box 4261
Copley, Ohio 44321
Charles J. Parshall, Jr., DVM
Secretary
(216) 666-5315

American Camping Association
Ohio Section
P. O. Box 105
Chagrin Falls, Ohio 44022
Mrs. Helen N. Bradburn
Executive Secretary
(216) 543-9435

American Dairy Association of Ohio
110 South Court Street
Marysville, Ohio 43040
Earl B. Poling, General Manager

American Jersey Cattle Club
2105 S. Hamilton
Columbus, Ohio 43227
(614) 861-3636

American Legion, Department of
Conservation
4060 Indianola Avenue
Columbus, Ohio 43214
Mr. Al Brick
(614) 268-7072

American Society of Agricultural
Engineers
2950 Niles Road
St. Joseph, Missouri 49085
J. L. Butt
Executive Vice President

American Society of Landscape
Architects, Ohio Chapter
3678 Heekin Avenue
Cincinnati, Ohio 45226
Mr. Gary W. Meisner, President
(513) 321-7700

American Society of Landscape
Architects, Ohio Chapter
129 South Main Street
North Canton, Ohio 44720
Thomas Bonnell, President
(216) 499-9944

Association of Ohio Garden Clubs
201 Beech Street
Doylestown, Ohio 44230
Mrs. James Pond
(216) 658-2948

Aullwood Audobon Center and Farm
1000 Aullwood Road
Dayton, Ohio 45414
Mr. Jack Wood
(513) 890-7360

Beaver Creek Protection Association
20273 Portage Road
Weston, Ohio 43569
Mr. Floyd Williams, President
(419) 669-2840

Belle Valley Area
16714 State Route 215
Caldwell, Ohio 43724
(614) 732-2381

Bob Evans Farms
Box 330
Rio Grande, Ohio 45624
Farm Director
(614) 245-5325

Bread for the World
5th Congressional District
Coordinator
Valerie Myers
1727A E. McPherson
Clyde, Ohio 43410

Bruckner Nature Center
5995 Horseshoe Bend Road
Troy, Ohio 45373
Mr. Robert F. Heidelberg
Director
(513) 698-6493

Burroughs Nature Club
9224 Sperry Road
Kirtland, Ohio 44060
Mr. Thomas Yates, President
(216) 256-3746

Carroll County Dairy Association
Court House
Carrollton, Ohio 44615

Central Ohio Cooperative Milk
Producers, Inc.
Marietta-Athens Division
1035 Greene Street
Marietta, Ohio 45750

Cincinnati Cooperative Milk Sales
Association, Inc.
1887 Central Parkway
Cincinnati, Ohio 45214

Cincinnati Museum of Natural History
1720 Gilbert Avenue
Cincinnati, Ohio 45202
Mr. DeVere Burt, Director
(513) 621-3889

Cincinnati Nature Center
4949 Tealtown Road
Milford, Ohio 45150
Mr. John Oney, Director
(513) 831-1711

Cincinnati Produce Growers
Association
2 Plum Street
Cincinnati, Ohio 45202

Clergy & Laity Concerned (CALC)
Aggie Hoskins
1736 Superior Avenue
Cleveland, Ohio 44114
(216) 566-0498

The Cleveland Greenhouse Vegetable
Growers Cooperative Association
19120 Detroit Road
Cleveland, Ohio 44116

Cleveland Growers Marketing Company
3800 Orange Avenue
Cleveland, Ohio 44115

Cleveland Health Education Museum
8911 Euclid Avenue
Cleveland, Ohio 44106
(216) 231-5010

Columbia Sheep Breeders Association
of America
P. O. Box 272, State Route 182
Upper Sandusky, Ohio 43351
Richard L. Gerber
Executive Secretary
(614) 482-2608

Columbus Fruit and Vegetable
Cooperative Association
4561 East Fifth Avenue
Columbus, Ohio 43219

Committee for a Country Common
405 Corry Street
Yellow Spring, Ohio 45387
Mr. Ralph Ramey
(513) 767-7375

Consumer League of Ohio
c/o Dorothy Austin
Executive Secretary
940 Engineers Building
Cleveland, Ohio 44114
(216) 621-1175

Cooperative Extension Service
Ohio State University
Columbus, Ohio 43210

CROP; Community Hunger Appeal
of Church World Service
4256 North High Street
Columbus, Ohio 43214
Margaret Brugler, State Director
(614) 261-7183

Crosby Gardens and Library
5403 Elmer Drive
Toledo, Ohio 43615
Ms. Susan LeCron
Executive Director
(419) 536-8365

Dairy and Nutrition Council
Council - Mid East
3363 Tremont Road
Columbus, Ohio 43201
(614) 451-2864

Darby Creek Association
2199 Amity Road
Hilliard, Ohio 43026
Mrs. L. D. Boggs, President
(614) 878-3786

The Dawes Arboretum
7770 Jackstontown Road, S.E.
Newark, Ohio 43055
Mr. Joseph White, Director
(614) 235-2355

Delphos Project Recycle
638 East Seventh Street
Delphos, Ohio 45833
Mr. Fred A. Ruen
(419) 692-6303

Distillers Feed Research Council
Lawrence E. Carpenter, PhD
Executive Director
1435 Enquirer Building
Cincinnati, Ohio 45202
(513) 621-5985

Eastern Order Buying Company
1561 Leonard Avenue
Columbus, Ohio 43203

Farm Labor Organizing Committee
714 South St. Clair
Toledo, Ohio 43601
Baldemar Velasquez, President
(419) 243-3456

Farm Markets of Ohio
35 East Chestnut Street
Columbus, Ohio 43215
(614) 225-8949

Farm and Power Equipment
Retailers of Ohio
6124 Avery Road
Columbus, Ohio 43214
Bill Davidson
Executive Director
(614) 889-1309

Farmers Political Action Committee
16 East Broad Street
Columbus, Ohio 43215
John Wettstein, Secretary-Treasurer

Federal Milk Marketing
Administrative Order 33
5908 Sharon Woods Boulevard
Columbus, Ohio 43229
(614) 891-1851

Federation of Ohio River Cooperative
320 Outerbelt Drive, Suite D
Columbus, Ohio 43213
(614) 861-2446

4-H Camp Ohio
11461 Camp Ohio Road
St. Louisville, Ohio 43071
Mr. Dave Hoy
(614) 745-2194

Friends of the Earth
Route 1
South Bloomingdale, Ohio 43152
Ed Grant, Branch Representative
(614) 887-4793

Fremont Beet Growers Association
1401 Walter Avenue
Fremont, Ohio 43420

Fremont Pickle and Tomato
Growers Association
1401 Walter Avenue
Fremont, Ohio 43420

Fruit Growers Marketing Coop
Newcomerstown, Ohio 43832

Garden Clubs of Ohio, Inc.
3826 Chevington Road
Columbus, Ohio 43220
Mrs. Harold Bird, Jr., President
(614) 451-1875

Grape Growers Cooperative
Association, Inc.
34402 Chester Road
Avon, Ohio 44011

Greenhouse Vegetable Packing
Company
430 West Bagley Road
Berea, Ohio 44017

Grove City Farmers Exchange
7366 London Street
Derby, Ohio 43117

Guernsey-Noble Feeder Cattle
Production Association
Route 4
Cambridge, Ohio 43725
Oscar Share

Hamilton County Vegetable
Growers' Association, Inc.
Cincinnati, Ohio 45202

Hunger Network
299 King Avenue
Columbus, Ohio 43215
(614) 424-6203

Hunger Task Force
65 South Fourth Street
Columbus, Ohio 43215
(614) 464-1956

Independent Livestock Marketing
Association
P. O. Box 5824
Columbus, Ohio 43221
Roger L. Connor, Secretary
(614) 486-9060

Institute for Environmental Education
8911 Euclid Avenue
Cleveland, Ohio 44114
Mr. Joseph H. Chadbourne
(216) 791-1775

Institute for Future Studies
and Research
166 Fir Hill
Akron, Ohio 44325
(216) 375-7887
Dr. Gary Gappert, Director

International Society of
Arboriculture
1877 Snouffer Road
Worthington, Ohio 43085
Dr. T. Davis Sydnor
Executive Secretary
(614) 846-4621

Izaak Walton League
P. O. Box 724
Tiffin, Ohio 44883
Mr. Edward W. Schekelhoff
Executive Director
(419) 447-7716

Joy Resident Education Center
Box 177
Clarksville, Ohio 45113
Mr. Gene Knight
(513) 289-2031

Kent Environmental Council
156 South Water Street
Kent, Ohio 44240
Ms. Ruth Meade, Secretary
(216) 673-4079

Lake Shore Erosion Committee
36681 Lake Shore Boulevard
Eastlake, Ohio 44094
Mrs. Chauncey Grantz
(216) 942-7798

Landmark, Inc.
P. O. Box 479
Columbus, Ohio 43216
(614) 225-8923

League of Women Voters of Ohio
65 South Fourth Street
Columbus, Ohio 43215
(614) 469-1505

Little Miami, Inc.
3012 Section Road
Cincinnati, Ohio 45237
Mr. Thomas L. Behan, Director
(513) 351-6400

Lutheran Memorial Camp
Box 8
Fulton, Ohio 43321
Ms. Robin McCullough

Miami Valley Milk Producers
Association
Greenville, Ohio 45331

Mid-States Terminals, Inc.
1235 Miami Street
Toledo, Ohio 43605

Mid-States Wool Growers
Association
3900 Groves Road
P. O. Box 26068
Columbus, Ohio 43227
Paul A. Getz, Secretary
(614) 861-2533

Mid-Wood, Inc.
P. O. Box 317
East Gypsy Lane Road
Bowling Green, Ohio 43402

Milk, Inc.
Toledo Division
210 North Westwood
Toledo, Ohio 43607

Milk Marketing, Inc.
519 East 11th Avenue
Columbus, Ohio 43211
(614) 294-2601

Mohican School in the Out of Doors
Route L-2, Box 287
Loudonville, Ohio 44842
Mr. Ron Reed, Director
(419) 994-3201

National Association of Greenhouse
Vegetable Growers
R. A. Gall Building
6500 Pearl Road
Cleveland, Ohio 44130

National Association of Supervisors
of Agricultural Education
c/o James E. Dugan
Room 910, 65 South Front Street
Columbus, Ohio 43215
(614) 466-3076

National Drive-In Fast Food and
Soft Ice Cream Association
14627 Watt Road
Novelty, Ohio 44072
c/o Harry J. Kimpel
Executive Secretary
(216) 338-5588

National Farmers Organization
Route 1
Mount Sterling, Ohio 43143
Mildred Davis, Secretary
(614) 869-2278

National Farmers Union
(See Ohio Farmers Union)

National Forest Products Association
41 Croswell Road
Columbus, Ohio 43214
Michael M. Westfall
District Manager
(614) 268-1436

Northeastern Ohio Growers
Cooperative
Chesterland, Ohio 44026

Northwestern Ohio Corn Hybrid
Association
Route 3
Delta, Ohio 43515

Ohio Agricultural Marketing
Association
35 Chestnut Street
P. O. Box 479
Columbus, Ohio 43216

Ohio Agricultural Marketing
Association
P. O. Box 479
35 East Chestnut
Columbus, Ohio 43216
C. William Swank, Executive
Vice-President
(614) 225-8795

Ohio Agricultural Research and
Development Center
Wooster, Ohio 44691
(216) 262-8176

Ohio Alfalfa Export Corporation
2404 Summit Street
Toledo, Ohio 43611
Eric A. Mengering
Secretary-Treasurer
(419) 726-2655

Ohio Alliance for Environmental
Education
445 King Avenue
Columbus, Ohio 43201
(614) 421-7819

Ohio Apple Institute
P. O. Box 666
New Philadelphia, Ohio 44663
Norman M. Witherspoon, Manager
(216) 343-8412

Ohio Association of County
Agricultural Agents
c/o Glenn Maddy
1401 Walter Avenue
Fremont, Ohio 43420
(419) 332-4318

Ohio Association of Garden Clubs, Inc.
Route 2
Warsaw, Ohio 43844
Mrs. Quenton Elder, President
(614) 824-3985

Ohio Ayrshire Club
Route 1
De Graff, Ohio 43318
Robert Dix, Secretary-Treasurer
(513) 585-5612

Ohio Bakers Association
50 West Broad Street
Columbus, Ohio 43215
William H. O'Neill
Executive Director
(614) 221-7833

Ohio Beef Marketing Program
6649 North High Street
Worthington, Ohio 43085
Carl E. Harsh
Executive Director
(614) 846-1602

Ohio Canners & Food Processors
Association
P. O. Box 312
Worthington, Ohio 43085
Wilbur A. Gould
Executive Officer
(614) 885-6045

Ohio Cattlemen's Association
c/o Dan L. Davis
Executive Secretary
42 West Hunter
Logan, Ohio 43138
(614) 385-2500

Ohio Christmas Tree Growers, Inc.
7808 Diagonal Road
Kent, Ohio 44240

Ohio Coal and Energy Association
40 South Third Street, S. 328
Columbus, Ohio 43215
Mr. James Trapp
(614) 224-0407

Ohio Conservation Congress
P. O. Box 407
New Philadelphia, Ohio 44663
Cecil S. Winters, President
(216) 364-1080

Ohio Conservation and Outdoor
Education Association
621 Mount Vernon Road
Newark, Ohio 43055
Mr. Len Feightner
(614) 366-4741

Ohio Conservation and Outdoor
Education Association
Division of Environmental Education
Ohio State University
Lewis Lane
Newark, Ohio 43055
Lillabelle Holt, Secretary
(614) 422-5589

Ohio Conservation Foundation
307 The Arcade
Cleveland, Ohio 44114
Mr. James Farmer
Executive Director
(216) 771-4100

Ohio Cooperative Extension Agents
Association
110 Cottage Street
Ashland, Ohio 44805
Calvin D. Knight
Executive Secretary
(419) 289-0000

Ohio Crop Reporting Service
Room 608 Federal Building
200 North High Street
Columbus, Ohio 43215
(614) 469-5590

Ohio Dairy Products Association, Inc.
1429 King Avenue
Columbus, Ohio 43212
(614) 486-6000

Ohio Dairymen's Association, Inc.
625 Stadium Drive
Columbus, Ohio 43210
John R. Staubus
Secretary-Treasurer
(614) 422-6565

Ohio Department of Agriculture
Consumer Information Center
Room 701, 65 South Front Street
Columbus, Ohio 43215
(800) 282-1995

Ohio Ecological Food and Farm
Association
7300 Bagley Road
Mount Perry, Ohio 43760
(614) 849-0105

Ohio Farm Bureau Federation
35 East Chestnut Street
P. O. Box 479
Columbus, Ohio 43216
Mr. Bruce Benedict
(614) 225-8829

Ohio Farm and Rural Vacation
Association
Route 1
Zanesfield, Ohio 43360
Mrs. Kenny Johnson, Secretary
(513) 666-4741

The Ohio Farmers Grain Corporation
New Weston, Ohio 45348

The Ohio Farmers Grain and
Supply Association
550 West Fourth Street, Box 351
Fostoria, Ohio 44830

Ohio Farmers Union
1011 North Defiance Avenue
P. O. Box 363
Ottawa, Ohio 45875
Charlie Nash, Executive Director
(419) 523-5300

Ohio Federation of Soil and Water
Conservation Districts
Fountain Square, Building A
Columbus, Ohio 43224
(614) 466-5283

Ohio Fertilizer and Pesticide
Association
P. O. Box 151
Worthington, Ohio 43085
Mr. George G. Greenleaf
Executive Director

Ohio Flying Farmers
Route 5
Greenville, Ohio 45331
Barbara Leis
Secretary-Treasurer

Ohio Future Farmers of America
Suite 910
65 South Front Street
Columbus, Ohio 43215
Dr. Earl Kantner
Executive Secretary
(614) 466-3076

Ohio Geological Society
Box 14322
Columbus, Ohio 43214
(614) 888-2770 or 436-1566

Ohio Grain, Feed and Fertilizer
Association, Inc.
6877 North High Street
Columbus, Ohio 43210
(614) 885-4429

Ohio Greenhouse Co-op Association
R. A. Gall Building
6500 Pearl Road
Cleveland, Ohio 44130
(216) 885-4761

Ohio Hospital, Institutional and
Educational Food Service Society
c/o Shirley McGonigal
735 State Mill Road
Akron, Ohio 44319
(614) 644-5959

Ohio Jersey Breeders Association
P. O. Box 532
Prospect, Ohio 43342
A. Bud Baird
Executive Secretary
(614) 494-2312

Ohio Junior Horticultural
Association
Department of Horticulture
Ohio State University
2001 Fyffe Court
Columbus, Ohio 43210
(614) 442-8326

Ohio Land Improvement Contractors
Association
Box 116, 84 North High Street
Dublin, Ohio 43017
Mr. Larry Trask
Executive Director
(614) 889-2314

Ohio Licensed Beverage Association
50 West Broad Street, Suite 1031
Columbus, Ohio 43215
Harold Rickert
Executive Secretary
(614) 224-3840

Ohio Milk Producers Federation
519 East 11th Avenue
Columbus, Ohio 43211
Donald E. Zehr, Executive Secretary
(614) 299-2601

Ohio Natural Foods Associates
252 East Blake Avenue
Columbus, Ohio 43202
Dorothy & Glenn Geiger
(614) 261-6264

Ohio Nut Growers Association
1807 Lindbergh, NE
Massillon, Ohio 44646
Raymond E. Silvis
Secretary-Treasurer
(216) 833-7373

OPIRG, Ohio Public Interest Research
Group, 65 South 4th Street, Room 400
Columbus, Ohio 43215
(614) 461-0136

Ohio Peach Council
245 North High Street
Columbus, Ohio 43216
William McNutt, Secretary
(614) 225-8947

Ohio Pest Control Association
18319 Nottingham Road
Cleveland, Ohio 44119
William Kirchiner
Secretary-Treasurer

Ohio Pesticide Education Association
245 North High Street
Columbus, Ohio 43216
Paul Slade, Administrative Secretary
(614) 225-8795

Ohio Pork Producers Council
105 Corner Lane
Delaware, Ohio 43015
Richard Isler
Executive Officer
(614) 548-6650

Ohio Potato Growers Association
4680 Indianola
Columbus, Ohio 43214
David Kelly, Manager
(614) 261-6834

Ohio Poultry Association
674 West Lane Avenue
Columbus, Ohio 43210
Robert L. Hooker
Executive Secretary
(614) 422-2089

Ohio Retail Food Dealers Association
1200 North Main Street
Canton, Ohio 44708
Richard C. Hetherington
Executive Director
(216) 494-2300

Ohio River Basin Commission
36 East Fourth Street, Suite 208
Cincinnati, Ohio 45202
(513) 684-3831

Ohio School Food Service Association
Division of School Food Service
Ohio Department of Education
65 South Front Street
Columbus, Ohio 43215
Robert Koon, Director
(614) 466-2945

The Ohio Seed Dealers
Association, Inc.
6150 Avery Road, Box 477
Dublin, Ohio 43017

Ohio Seed Improvement Association
6150 Avery
Columbus, Ohio 43221
Roy Becker, Secretary-Manager
(614) 889-1136

Ohio Society of American Foresters
Fountain Square, C-3
Columbus, Ohio 43224
Mr. Lawrence J. Eklers, Ed.
(614) 466-7842

Ohio Soft Drink Association
230 East Town Street
Columbus, Ohio 43215
Norton R. Webster
Executive Secretary and Counsel
(614) 228-2945

Ohio State Grange
1031 East Broad Street
Columbus, Ohio 43205
Mr. James Ross, Master
(614) 258-9569

Ohio State Horticultural Society
245 North High Street
Columbus, Ohio 43216
William McNutt
Administrative Secretary
(614) 225-8947

Ohio Swine Breeders & Feeders
Association
Route 1
Fredericktown, Ohio 43019
J. William Moody, President

Ohio Trucking Association
50 West Broad Street
Columbus, Ohio 43215
Donald B. Smith
Executive Vice President
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Ohio Valley Egg Cooperative
P. O. Box 252
Milford, Ohio 45150
(513) 831-3470

Ohio Valley Improvement
Association, Inc.
One Lytle Place
621 Mehring Way, Suite 507
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Ohio Vegetable & Potato Growers
Association
35 East Chestnut
Columbus, Ohio 43216
William McNutt
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Ohio Vocational Agriculture
Teachers Association
65 South Front Street, Room 910
Columbus, Ohio 43215
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Ohio Warehousemen's Association
5090 Thornhill Lane
Columbus, Ohio 43220
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Worthington, Ohio 43085
Mr. George K. Richards
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Pioneer Company
245 North High Street
Columbus, Ohio 43216

Potato Chips and Snack Food
Association
26250 Euclid Avenue
Euclid, Ohio 44132
c/o Larry Burch, Executive
Vice President
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Producers Livestock Association
5909 Cleveland
Columbus, Ohio 43227
Gary Hiller, General Manager
(614) 890-6666

Professional Land Surveyors
of Ohio
7653 Foxboro Court
Columbus, Ohio 43206
Charles Coutellier
Executive Director
(614) 889-7505

Rivers Unlimited
French Park
3012 Section Road
Cincinnati, Ohio 45237
Mr. L. H. Fremont
(513) 851-1500

Rural Life Ministry
Diocese of Toledo
1550 Clough Street #6
Bowling Green, Ohio 43402
Susan Raftery
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Rural Resources
5115 Wooden Shoe Avenue
Cincinnati, Ohio 45232
David Rosenberg
(513) 681-4574

Rural Service, Inc.
2025 West State Street
Fremont, Ohio 43420

The Rurban Project
3800 Bridge Avenue
Cleveland, Ohio 44113
Reverend Charles Frye
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Salem Fruit Growers Cooperative
Association
Box 3
Greenford, Ohio 44422

Sandusky Cooperative Milk
Producers Association
Route 1
Castalia, Ohio 44824

Shaker Lakes Regional Nature
Center
2600 South Park Boulevard
Cleveland, Ohio 44120
Mr. Richard A. Horton
(216) 321-5935

Southcentral Ohio Preservation
Society
P. O. Box 6
Piketon, Ohio 45601
Mrs. Joseph Vanmeter, Coordinator
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Southeastern Ohio Beef Cattle
Improvement Association
Gallipolis, Ohio 45631

Southeastern Ohio Farmers Co-op
1186 3rd Street
Bidwell, Ohio 45614

Sun Project PSC
247 West North Street
Wooster, Ohio 44691
Marty Bowman
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Toledo Gardeners Cooperative
Association
30 North Huron Street
Toledo, Ohio 43604

Tri-County Producers Co-op
Route 2
Beloit, Ohio 44609

Trust for Public Land, Ohio
Field Office
401 Euclid Avenue, No. 342
Cleveland, Ohio 44114
Mr. Thomas W. Offutt, III
(216) 241-7630

United Church of Christ,
Ohio Conference
Hunger Task Force
41 Crosswell
Columbus, Ohio 43215
Marge Ramp, Chair

Utica Concerned Citizens
17060 Vance Road
Utica, Ohio 43080
Mr. Ron Branstool
(614) 892-2445

Wildlife Legislative Fund
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Columbus, Ohio 43215
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Alexandria, Ohio 43001
Mr. Douglas A. Andrews, President
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Woodland Altars
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Mr. Larry Bright
(513) 588-2105

Wooster Egg Producers, Inc.
Box 457
Wooster, Ohio 44691

Y.M.C.A. Camp Campbell Gard
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Terry Carroll
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Y.M.C.A. Camp Kern
Box 5291, State Route 350
Oregonia, Ohio 45054
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ABOUT THE CORNUCOPIA PROJECT...

The Cornucopia Project of Rodale Press, Inc., has as its goals, first, to document where the U.S. food system is vulnerable, and second, to suggest how the system could be transformed to sustain and conserve our resources. For more information, contact The Cornucopia Project, Rodale Press, 33 East Minor Street, Emmaus, Pennsylvania 18049. (215) 967-5171.

ABOUT RURAL RESOURCES...

Based in the Ohio, Kentucky, Indiana Tri-State area, Rural Resources, Inc. is a non-profit education and advocacy organization concerned with food, farm and land use issues. Projects of Rural Resources include establishment of the Cincinnati Tailgate Marketing Project, Cincinnati Community Gardens, the Ohio Ecological Food and Farm Association and the East Central Cornucopia Alliance. For more information, write Rural Resources, 11 Interwood Place, Cincinnati, Ohio 45220. (513) 481-0016.

ABOUT THE EAST CENTRAL CORNUCOPIA ALLIANCE...

The East Central Cornucopia Alliance is a network of organizations and individuals in Illinois, Indiana, Kentucky, Michigan and Ohio who have joined together to promote the ideal and work for the reality of a secure food system in this region. Its goal is to develop and see implemented a food plan for each of the states in this region. For more information, contact Rebecca E. McDowell, ECCA Coordinator, Route 2, Box 40A, Cloverdale, Ohio 45827. (419) 596-4641.

C8111-1.12

Ohio Food Production and Consumption

	State's Production Rank[a]	FLOW		PRODUCTION (1,000's)			CONSUMPTION (1,000's)			RETAIL DOLLARS (in 1,000's of 1981 $)		ACREAGE
		% Imported[b]	% Exported[c]	Pounds Farm Wt.[d]	Pounds Retail Weight[e]	1981 Retail Dollars[f]	Pounds Farm Weight[g]	Pounds Retail Weight[h]	1981 Retail Dollars[i]	Imports[j]	Exports[k]	Land Required to Produce 100% of Ohio Consumption[l]
MEATS												
Beef/Veal	22[m]	69		358,356[n]	259,104	681,444	1,135,888[n]	859,441	2,260,330	1,599,628		5,328,534[o]
Lamb & Mutton	11	29		11,562	10,020	32,966	16,196	14,037	53,285	15,453		4,153[p]
Pork	10	39		483,351[q]	449,981	755,968	792,531	737,464	1,238,940	483,187		705,948[r]
Lard			55	62,080	59,692	47,155	28,073	26,993	21,324		25,831	
POULTRY												
Chicken	25[s]	93		55,290[t]	39,809	29,458	749,819[u]	539,871	399,505	371,540		271,020
Eggs	10	21		305,234[v]	304,625	147,776	384,388	373,576	180,839	37,976		159,050
Turkey	16	65		50,112[w]	40,090	39,238	141,716[x]	113,369	111,102	72,216		85,886
FISH		99.9		330[x]	198	505	228,545	137,127	349,674	349,324		NA
DAIRY												
Butter	8	43		27,028[y]	27,028	53,515	47,509	47,509	94,068	40,[illegible]		167,285
Cheese, Cottage	3		62	127,269[z]	127,269	108,179[aa]	48,588	48,588	41,760		67,071	
Cheese, Others	8	5		95,166	95,166	288,353	190,035	190,035	723,000	361,506		397,690
Ice Cream	4		15	220,590	220,590	194,119	186,795	186,795	244,185		29,118	118,077
Ice Milk & Sherbert	26		23	118,430[bb]	118,430	70,335	90,698	90,698	54,549		16,177	
Milk, fluid & cream	7		12	4,270,000	4,270,000	1,024,800	2,461,812	2,461,716	540,812		430,416	410,354
Milk, evap & cond.			42	132,056	132,056	84,516	76,662	76,612	49,032		35,497	28,343
Milk, non-fat, dry			9	38,087	38,087	66,652	34,551	34,551	60,46[illegible]		5,999	53,567
GRAINS[cc]												
Barley: Human	30	98		479[cc]	477[dd]	377	18,356[dd]	18,295[dd]	14,453	13,875		7,354
Livestock				(19,489)								
Corn: Human	5		51	2,406,222	1,780,603	1,317,646	1,176,919	737,464	545,723		671,999	185,368
Livestock				(22,272,978)								
Oats: Human	3	29		49,741	23,723	16,978	70,183	33,472	26,778	7,766		31,332
Livestock				(572,019)								
Popcorn	4		49	50,820	44,480	23,130	25,914	25,913	13,475		11,334	7,853
Rice		100		0	0	0	100,416	100,416	65,270	65,270		NA
Rye: Human	16	82		1,985	1,544	494	9,718	7,558	2,419	1,984		5,258
Livestock				(10,951)								
Soybeans: Human	6		35	139,692	139,692	192,775	21,595	21,595	15,761		163,859	9,998
Livestock				(6,844,884)								
Wheat: Hard (bread, etc)	11	100		0	0	0	1,720,0[illegible]	979,127	274,156	274,156		333,036[ff]
Soft red winter (pastry, etc)	1		91	4,027,800	3,100,499	775,125		344,903	96,574		705,364	117,316
VEGETABLE OIL												
Margarine								120,926	84,648			
Oils (soy)			24	321,206	321,206	411,144	245,092	245,092	313,718		97,426	
Shortening								197,585	150,165			
VEGETABLES[ee]												
Artichokes		100		0	0	0	3,239	3,239	3,207	3,207		NA
Asparagus												
Fresh		98		174[ff]	174	501	3,239	3,239	6,446	6,317		2,699
Canned[gg]		100		0	0	0	3,952[ee]	3,239[ee]	4,114	4,114		3,292
Frozen		100		0	0	0	1,242[ee]	648[ee]	1,866	1,866		659
Beans, Dry Edible		99		803	803	538	70,183	70,181	47,021	46,551		52,768
Beans, Lima												
Canned		44		1,136	1,817	1,381	2,025	3,239	2,462	1,083		991
Frozen		100		0	0	0	5,329	5,075	7,054	7,054		2,645
Beans, Snap												
Fresh		84		2,400	2,400	1,272	15,116	14,036	7,439	6,174		4,010
Canned		100		0	0	0	47,660	66,941	30,123	30,123		13,617
Frozen		100		0	0	0	12,741	10,797	10,365	10,365		4,112
Broccoli												
Fresh		99.6		143[ff]	143	99	19,435	18,356	12,666	12,615		2,447
Frozen		100		0	0	0	20,105	15,116	16,930	16,930		2,419
Cabbage	11											
Fresh		65		34,300	27,000	9,720	91,177	90,698	32,651	21,223		4,180
Sauerkraut[gg]	3		5	54,000	53,820	26,372	24,087	12,956	6,348		14,505	492
Carrots												
Fresh		41		40,336	40,336	17,748	68,024	65,662	28,979	11,881		2,803
Canned		100		0	0	0	7,196	5,393	2,537	2,537		306
Frozen		100		0	0	0	18,248	10,041	8,234	8,234		712
Brussels Sprouts												
Frozen		100		0	0	0	3,590	2,699	3,023	3,023		240
Cauliflower												
Fresh		100		0	0	0	15,116	14,037	2,807	2,807		2,807
Frozen		89		750	750	150	7,103	4,967	7,600	6,764		1,192
Celery												
Fresh		80		17,200	17,200	8,600	84,220	78,818	39,409	31,527		1,609
Corn, Sweet	4											
Fresh		68		24,955	22,875	4,804	77,741	71,260	14,965	10,176		9,501
Canned		68		46,655	20,995	9,447	146,089	62,625	28,180	19,162		20,870[jj]
Frozen		52		36,890	9,970	10,468	77,104	20,838	21,880	11,378		11,015[jj]
Cucumbers												
Fresh		100		0	0	0	46,427	43,188	23,753	23,753		1,661
Pickles[gg]	3		56	125,060	125,060	106,301	55,430	74,499	63,324		59,529	2,704
Eggplant												
Fresh		87		820	820	566	6,478	5,399	3,725	3,241		360
Escarole/Endive	3		16	7,700	7,700	5,180	6,478	6,478	4,470		829	418
Garlic		99.3		77	77	230	10,797	8,638	25,828	25,647		664
Lettuce	12	97		8,100	8,100	4,050	289,371	268,845	134,422	130,389		24,440
Mushrooms		67		8,908	8,908	15,945	26,943[hh]	26,993	48,317	32,372		NA
Onions, Green				9,323			NC					
Frozen		100		0	0	0	14,684	7,342	8,003	8,003		471
Storage, Fresh		86		16,700	15,100	5,134	116,612	110,129	37,444	32,202		2,936
Peas, Dry Field		100		0	0	0	4,319	4,318	2,116	2,116		1,775
Peas, Green												
Canned		99.4		158	158	14	26,332	35,630	16,034	15,938		7,836
Frozen		100		0	0	0	18,125	16,627	17,458	17,458		5,809
Peppers, Green		87		4,900	4,900	5,145	38,871	35,630	37,412	32,548		4,192
Potatoes												
Fresh		60		223,400	223,400	51,382	554,987	547,407	125,903	75,512		24,666
Processed		100		0	0	0	695,354	259,138	101,621	101,621		18,004
Pumpkin/Squash[ii]					NC	NC	4,319	4,319	2,721			487
Spinach												
Fresh		82		1,516	1,516	89[illegible]	8,638	7,558	4,459	3,656		967
Processed		100		0	0	0	16,444	13,497	6,305	6,305		1,658
Sweet Potatoes												
Fresh		99.6		144	144	63	41,030	36,710	16,152	16,087		2,409
Processed		100		0	0	0	14,037	10,797	4,103	4,103		915
Tomatoes												
Fresh		94		9,100	9,100	6,552	144,685	123,091	83,957	78,920		9,043
Processed[kk]	2	28		504,000	504,000	236,880	695,339[kk]	239,694	138,439	38,763		23,178
FRUITS[ll]												
Apples: Fresh	[illegible]	44		170,000	105,000	54,600	180,317	172,752	89,831	39,526		12,380
Processed							123,846	82,492				
Apricots		100		1	0		8,778					NA
Avocados		100		0	0	0	8,638					NA
Bananas		100		0	0	0	224,586	224,578	78,602	78,602		NA
Berries, Black, Blue, & Rasp: Fresh							3,938					1,641[mm]
Processed		85		601								NA
Cranberries: Fresh		100		0	0	0	1,080					
Processed				0	0	0	2,915					
Strawberries: Fresh	5	49		10,500	8,300	6,557	20,515	18,355	14,500	7,105		2,931
Processed							13,454					1,922
Cherries: Fresh		98		387	332	379	7,558	6,478	6,348	6,221		6,763
Processed							14,830					
Citrus (all): Fresh		100		0	0	0	309,886	300,157	141,074	141,074		NA
Processed						0	449,281					NA
Dates & Figs		100		0	0		9,718					NA
Grapes: Fresh[nn]	7	46		23,400	24,000	21,120	43,190	38,869	34,205	15,734		8,543
Processed							83,421					
Melons:												
Cantaloup & Honeydew		81		14,955	14,955	5,533	77,741	71,263	25,416			13,034
Watermelon		98		2,265	2,265	430	123,091	111,213				
Olives		100		0			8,638					NA
Peaches & Nectarines	20											
Fresh		90		12,000	12,000	4,200	78,821	75,579	26,453	23,808		9,488
Processed							44,269					5,558
Pears: Fresh		96		1,651	1,651	941	26,994	25,913	14,770	14,179		3,727
Processed				0	0		20,137					2,896
Pineapple & Papaya		100		0	0		122,260					NA
Prunes/Plums: Fresh		99		640	640	346	17,276	16,196	8,746	8,659		2,478
Processed		100		0			34,768					5,327
SWEETS, SPICES, NUTS & OTHER												
Cocoa		100		0	0	0	28,073					NA
Coffee & Tea		100		0	0	0	92,858	120,926	466,774	466,774		NA
Herbs & Spices		100		0	0	0	17,276	17,276	269,857[oo]	269,857		
Honey	23	81		2,460	2,460	3,665	12,957	12,956	19,304	15,636		NA
Maple Syrup	4	10		971	971	3,107	1,080	1,079	3,500	350		
Peanuts		100		0	0	0	65,864	65,862	108,014	108,014		NA
Sugar Beets	11	89		678,000	101,700[pp]	28,476[qq]	6,017,762[pp]	902,664	252,746[qq]	224,270		157,533
Tree Nuts		99.8		39	39	62	18,356	18,355	29,184	29,126		
TOTALS				15,450,404	12,985,948	7,025,677	21,975,861	13,593,929	10,917,145	6,027,004	2,234,954	8,942,243

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